Economics Education and Research Consortium
Working Paper Series

No 2K/01

Analysis of the Impact of Privatisation on the Performance of Medium and Large Industrial Enterprises

Yuri Perevalov
Ilya Gimadi
Vladimir Dobrodey

CONTENTS

NON-TECHNICAL SUMMARY

Privatisation has become one of the most powerful strategies implemented by policy-makers all over the world to improve the performance of enterprises. This course of action has a very good theoretical background. Many theories have been developed as to why private firms should outperform state-owned enterprises (SOEs). Some of them are strongly supported by empirical studies carried out in different countries all over the world.

At the same time, privatisation in Russia, the largest example in world history, seemed to have the most ambiguous results. There are even views that privatisation in Russia has turned out to be a great failure. However, there is a lack of statistically significant evidence on the matter, and there are only few studies where the impacts of privatisation and transition are carefully separated.

We aim to check empirically the hypothesis that privatisation in Russia also promotes performance improvements, but these improvements are attenuated by the negative influence of the processes of transition. Basing our approach upon various theoretical and empirical studies, we analyse whether privatisation has a positive impact upon a firm's ability to generate revenue growth and upon the level of workers' wages, whether it leads to increases in profitability and improvements in operating efficiency, and whether it causes reductions in employment.

We use fixed and random effects models for our panel data of 198 medium, large and extra-large industrial enterprises in the Sverdlovsk Oblast during 1992-1996. The panel covers all the main industries in one of the most developed regions of Russia. The majority of the enterprises were privatised during this period. It helps us to compare the results of SOE and privatised enterprises, as well as the performance of the same enterprise before and after privatisation. We separated out the effects of ownership change from the influence of transition, industry affiliation, size of firm and competition that could seriously distort the results.

The study offers several main conclusions.

First, transition is the major determinant of industrial performance in the region, and its negative influence only strengthens during the period under analysis.

Second, privatisation "on average" produces decent improvements only in operating profit margin (costs per unit of revenues) and, to a lesser extent, in the productivity of labour. We failed to find any influence of privatisation "on average" on the total profitability of businesses, revenue growth, employment, and the level of workers' wages.

Third, we reveal that some options of privatisation have led to better performance and some, the reverse. It means that privatisation in Russia is heterogeneous; that is why it is almost useless to analyse its effect "on average". We find that enterprises privatised by option 2, the lease of assets without buy-out and the privatisation of the residual state share by option 2 or by lease/buy-out, show better performance results. Option 1 causes a decrease in sales and reductions in employment and seems to be the worst of the privatisation methods. At the same time, we failed to find any influence of the methods of privatisation on the level of workers' wages.

Fourth, we showed that the date of the approval of the privatisation plan was as important for performance results as the state shareholding because, from this date, the enterprise officially leaves the state management. The state seems to be a passive shareholder. However, when the state has majority (or, though worse, blocking) control, it is preferable to a state minority stakeholding, possibly because of the absence of a monitoring shareholder in the latter case to prevent managers from achieving their own objectives at the expense of the other shareholders. That is why the state should keep majority control over privatised enterprises or else diminish its stake below 5% in order to avoid a negative drop in revenue growth, employment and profit margin caused by the absence of a monitoring shareholder.

We found also that the corporatisation of a state-owned enterprise, i.e. its transformation into a joint stock company with 100% state ownership, was not worse than its privatisation and even better than the case with a state share between 5 and 51%. In order to have improvements in the effectiveness of state-owned enterprises, the state could corporatise even some of the enterprises which are now prohibited from being privatised, while preserving 100% of the shares in state ownership because the mere fact of privatisation is important.

Fifth, we did not find any evidence that the size of a firm played any role in its performance results. At the same time, competition in industry increases costs per unit of revenue and decreases labour productivity. The latter contradicts the common point of view on the role of competition. In our opinion, the main reason for this is the domination of the effects of demand elasticity by the effects of demand reduction which does not stimulate managerial efforts. We found also significant differences in adjustment across industrial sectors.

Finally, we find that selection bias seems to exist in our sample, but it is a negative selection bias C it is not the better enterprises that are chosen for privatisation, but the worse ones C which obviously only handicaps the impact of privatisation. The negative dynamics of a firm's performance before privatisation is usually considered as the consequence of a desire of managers to force employees into privatisation or to lower the price of the enterprise in order to buy it more cheaply. We argue, however, that bad performance is due to the disintegration of the planned communist system, the disruption of previous production links, and the transition to the market economy. Under conditions of worsening performance results, privatisation seemed to managers and employees as the only possibility for improving the situation.

1. INTRODUCTION

Privatisation is one of the most important elements of transition in Russia. In 1992, Russia entered the club of numerous countries all over the world that, in the last decade, has launched ambitious privatisation programmes. More than 15,000 state-owned enterprises, at a conservative estimate, were privatised across the world between 1980P 1992, most of them since 1990 (Kikeri *et al*, 1994). However, the number of privatised enterprises in Russia is higher than in all the other countries of the world put together. Moreover, in contradiction with other countries, where privatisation, as a rule, has realised its targets, the results of privatisation in Russia seem to be ambiguous. It is a widespread opinion that privatisation in this country has turned out to be a great failure.

At the same time, there is a lack of statistically-significant evidence on the matter. Most of the studies in Russia do not have a sufficient period of post-privatisation and are based on surveys made in a fixed year. In the absence of time-series data, it is hard to find any clear evidence of the effect of privatisation. It is especially hard in conditions of the extremely volatile transition processes that are taking place in Russia. However, now "the dust has settled", we can look for the systematic effects of privatisation.

Privatisation in Russia had many proclaimed targets, from the formation of private property to the attraction of foreign investment.[1] This work is concerned with a crucial issue of privatisation: its influence upon industrial enterprise performance. It is well-known that economic reasons stood behind the reform in Russia, and it is widely believed that privatisation would considerably improve the efficiency of enterprises. Improvement of enterprise performance was one of the main targets of privatisation in Russia. Was the target realised? What was

[1] The targets of the Russian privatisation programme are quite similar to the targets of privatisation in other countries. For example, in the United Kingdom they are as follows: (1) raise revenue for the state; (2) promote increased efficiency; (3) reduce government interference in the economy; (4) promote wider share ownership; (5) provide the opportunity to introduce competition; and (6) expose SOEs to market discipline (Megginson *et al,* 1994).

the real impact of privatisation upon enterprise performance in Russia? How can this impact be measured?

Trying to answer the questions, we analyse panel data for 198 industrial enterprises in the Sverdlovsk Oblast, which is one of the most industrialised regions in Russia, during 1992P1996. The panel data includes medium, large and extra-large enterprises in almost all the industries of the region. The majority of the enterprises were privatised in the analysed period, and this facilitates a comparison of the performance of state-owned and privatised enterprises, as well as the performance of enterprises before and after privatisation.

The rest of the paper is organised as follows. In Section 2, we review theoretical views on the engines of performance improvements after privatisation, the empirical evidence on the issue from different countries, and the methods used. We also analyse the problem of selection bias that can seriously distort the results. Section 3 reports the objective of our study, the basic hypotheses that are checked, and the models used. Section 4 focuses on the description of our sample. In Section 5, the main results of the study are presented, including the average effects of privatisation, the effect of different options for it and the impact on a firm's performance of the state's stake in ownership and equity. In Section 6, we discuss the results and the validity of the research hypotheses. In Section 7, the existence of the problem of selection bias in our sample is analysed. Finally, Section 8 contains some conclusions for the adjustment of privatisation policy. The Appendices provide a detailed description of the sample (Appendix B), regression variables (Appendix A), and regression statistics (Appendix C).

2. DESCRIPTION OF THE PROBLEM AND AN OUTLINE OF ITS INVESTIGATION

2.1. Theoretical background

Governments attempt to privatise state-owned enterprises for various reasons: in order to raise revenue; to create popular capitalism; to reward political loyalists; to placate the demands or suggestions of external financing agents; to decrease the administrative burden of state bureaucracy; and to make the private sector responsible for necessary

enterprise investments (Nellis, 1991). However, the primary reason is to improve the efficiency of SOEs and, as a result, to reduce the budgetary burden on the state. In Russia, the improvement of enterprise performance was the second privatisation objective of significant importance determined by the State Programme of Privatisation of State and Municipal Enterprises in the Russian Federation in 1992. In the Fundamentals of the State Privatisation Programme after 1 July 1994, it became the highest priority objective.

There are different theoretical views why state-owned enterprises are less effective than private ones.

Shapiro and Willig (1990) regard state-owned enterprises as instruments capable of curing market failures by implementing pricing policies that take account of social marginal costs (*the social view*). It should be added that SOEs in former socialist countries usually played an important social role as providers of numerous social functions and services: housing; medical care; recreation facilities; and so on. These functions and expenses also negatively influenced the performance effectiveness of SOEs.

However, contra arguments can be adduced. In socialist countries, wages were strictly limited and not very differentiated. Under these conditions, additional social functions and services could be considered initiatives for more effective activity. These functions and services could also have a stimulating character in the transition period, when many of them require payment, but employees of enterprises with a developed social sphere can use them free of charge.

Private firms should be less subject to political interference (*the political view*). According to Shleifer and Vishny (1994), political interference in the firm results in excessive employment, poor choices of product and location, lack of investment and ill-defined incentives for managers. SOEs may be more susceptible to pressure from interest groups, while private firms can focus solely on maximising profits; and private investors generally have a long-term horizon when they acquire assets which can be sold, whereas the electoral assets enjoyed by politicians tend to be more fleeting and short-lived (Phelps, 1992).

Contra arguments are that, in the absence of the necessary institutions, private owners are not interested in keeping firms' assets in good condition in the long-run, nor are they able to (Nellis, 1999). Their interests become short-term and speculative. Then, political

interference turns out to be long-term and more preferable for the improvement of firms' performance.

Privatisation leads to better incentives (*the incentive view*). Vickers and Yarrow (Vickers and Yarrow, 1988) argue that managers of SOEs may lack high-powered incentives or may not be properly monitored. The residual cash flow claims of SOEs are not readily transferable like the shares of a private corporation. This impairs residual claimant incentives to monitor managers and, ultimately, degrades firm performance (Dewenter and Malatesta, 1998). Supervision by governments tends to be bureaucratic, rigid and more interested in seeing that regulations have been followed rather than that opportunities have been seized (Nellis, 1991). Under public ownership, the government retains unconditional control over the use of the assets of the firm. It encourages rent-seeking behaviour by firm insiders. A government is vulnerable to political pressure to maintain established rents (high wages/low effort, high and secure employment, etc.); and it leads to a loss of incentives (Perotti and Guney, 1993). Private firms are supervised by self-interested shareholders. Private owners have stronger incentives to maximise profits than do government appointees, because they own equity and so bear the financial consequences of their decisions. Private firms are also more capable of offering decent incentives and salaries to managers (Barberis *et al*, 1996). Private firms may find it more difficult to get public assistance; therefore, the penalty for failing to maximise profits is harsher, and perhaps the fruits of success are also sweeter (Phelps, 1992).

Contra arguments are that, according to agency theory and the free-rider problem, the government is the blockholder in SOEs and can monitor the managers of state-owned enterprises more intensely than shareholders in diffusely-held private corporations can monitor their managers (Dewenter and Malatesta, 1998). It should be added that, in the period of ownership changes, managers could get out of control. In the conditions of the absence of an adequate legal base, legal nihilism and total corruption, new owners and managers could be interested only in quick enrichment. New owners receive ex-state equity very cheaply, and they can have stronger initiatives not to maximise profit but to convert the equity into a liquid form and privatise it completely by transferring it to the accounts of foreign banks or in other ways.

Private owners choose the best managers to run their firm efficiently (*the human capital view*). Managers of state firms are selected

for their ability to get along with politicians, address political concern and lobby for assistance. In contrast, managers of private firms are selected for their ability to run firms efficiently (Barberis *et al*, 1996). SOEs may be pressed to hire politically-connected people rather than those best qualified to perform the desired tasks (Krueger, 1990).

Contra arguments are that, if the new owners are interested not in performance improvements but in quick enrichment, they will select the appropriate managers.

On the other hand, neo-classical economic theory suggests that the relationship between ownership and performance is tenuous. Efficiency is viewed as determined more by market structure and the degree of competition than by who owns the assets (Nellis, 1991). Competition generates an efficient allocation of resources, reduces managerial slack and stimulates managerial and worker efforts, and leads to cost-reducing investment or quality-improving expenditure (Koning, 1997). As a result of competition, greater opportunities for the comparison of performance, the responsiveness of performance to managerial efforts and the probability of bankruptcy generate sharper incentives for managers (a thorough review of the theoretical basis for the belief that competition drives forward productivity improvements is presented in Nickell, 1996). A firm's ownership structure is subject to market pressure, so that, in the long-run, each firm that is capable of surviving competition will end up with an ownership structure that is essentially close to the optimal (Demsetz and Lehn, 1985).

However, privatisation strengthens competition, which enforces the efficiency of the firm (*the competition view*). As Kikeri *et al* (1994) stress, over-extended and poorly-performing SOEs have slowed the growth of the private sector (and the increase in competition). Government often blocks the entry of private firms that would compete with SOEs; government credits to capital-intensive SOEs often crowd private firms out of credit markets; bankers tend to assume that there is an implicit government guarantee for credits to SOEs C a perception leading to the disadvantage of the private sector; and the inefficient provision of critical inputs by badly-managed public utilities increases the costs of business to private firms and limits the potential for their expansion. Private enterprises should be more subject to the discipline of commercial financial markets than SOEs, because SOEs operate on Kornai's famous "soft budget constraint" (Barberis *et al*, 1996): they

often obtain capital at less than the market rate of interest and enjoy subsidies from the state.

However, the arguments for the competition view are only valid if private firms are indeed more effective than state-owned ones, but the latter is not obvious.

That is why, from a theoretical standpoint, it is not clear that ownership form by itself determines relative profitability or efficiency.

2.2. Empirical background

Several studies were carried out in industrial and developing countries in order to check empirically the impact of privatisation. Studies undertaken in industrial economies largely attributed the superior efficiency of private as opposed to public firms to market structure rather than to ownership, while the few studies of developing countries revealed marginal efficiency differences between public and private firms (Kikeri *et al*, 1994). More recent studies by Galal, Jones, Tandon and Vogelsang (1994) in Britain, Chile, Malaysia and Mexico; by Megginson, Nash and van Randenborgh (1994) in Austria, Canada, France, Germany, Chile and 13 other countries; and by La Porta and Lopez-de-Silanes (1997) in Mexico, showed the considerable economic benefits from privatisation of SOEs. On the basis of a sample of 500 companies in more than 32 countries, Dewenter and Malatesta (1998) present empirical evidence that state-owned firms are less efficient than private firms. At the same time, for the sub-sample of 63 privatised firms, they find little evidence that privatisation itself raises firm performance (except for a few indicators).

A number of studies have been made on privatisation in transition economies. As Frydman, Gray, Hessel and Rapaczynski (1997) point out, the post-communist transition environment, ripe with transition shocks and characterised by far from equilibrium conditions, offers a unique testing ground for hypotheses concerning the role of ownership in corporate behaviour and performance.

Research in Poland by Grosfeld and Nivet (1997) showed that privatised firms invested more and had greater capacity to ensure higher output growth. Frydman *et al* (1997, 1998) found that private ownership dramatically improved corporate revenue performance in the Czech Republic, Hungary and Poland, but there is no comparable effect of ownership change on cost reduction. A comprehensive analysis

by Anderson, Djankov, Pohl and Claessens (1997) of the privatisation of more than 6,000 industrial firms in Bulgaria, the Czech Republic, Hungary, Poland, Romania, the Slovak Republic and Slovenia showed that privatised firms achieved higher labour productivity growth and growth in total factor productivity than did state-owned firms. At the same time, Konings (1997) claims that there is little or no difference in performance for privatised and state-owned enterprises in Slovenia, Hungary and Romania.

Earle and Estrin (1996) present empirical evidence that privatisation in Russia did have an impact on enterprise efficiency, but domestic market structure and the hardening of the budget constraints mostly had little effect. Later, they found systematic effects of private ownership on several types of restructuring behaviour and on labour productivity (Earle and Estrin, 1997). A comparative analysis of the economic performance of more than 2,000 Russian state-owned and privatised enterprises carried out by experts in Saint-Petersburg and Moscow showed that private enterprises were ahead of state-owned ones on basic economic indicators (жор *et al*, 1997). The difference was more significant for the effectiveness of production and less for the financial indicators.

Perevalov *et al* (мNкоолою *et al*, 1998a, 1998b) analysed industrial enterprises in the Sverdlovsk Region of Russia and showed a positive influence of privatisation upon their performance, although this influence was hidden by the negative processes of transition.

At the same time, according to a large research programme in Russia by the World Bank, ownership changes are generally weakly associated with most indicators of performance, including sales, wages and employment (Commander *et al*, 1996). Finally, Nellis (1999) comes to the conclusion that, the farther east one travels, the less has privatisation improved firms' performance, and the first and largest disappointment is Russian privatisation.

Therefore, the results are rather contradictory, probably because of selection bias and differences in the methodology applied.

2.3. Selection bias

In all the above-cited examples of empirical studies, privatisation is considered exogenously determined. However, we do not know what were the real reasons for the privatisation of the concrete enterprise.

For example, state ownership could be preserved to shore-up firms that are not competitive in the market, or better firms could be chosen for privatisation. Thus, treating privatisation as exogenous can confuse the direction of causality. If the performance results of an enterprise determine the decision to privatise it, then the assumption that privatisation affects performance leads to a misinterpretation of the relationship and to incorrect privatisation decisions.

As Megginson *et al* (1994) and Dewenter and Malatesta (1998) point out, many empirical studies comparing government and private firms use very small or rather specialised samples. Indeed, Caves and Christensen (1980) examine Canadian railroads; Atkinson and Halvorsen (1986) study electric utilities; and Eckel, Eckel and Singal (1997) look at British Airways. The performance comparison reported by Martin and Parker (1995) is based on a sample of 11 firms. Kole and Mulherin (1997) examine five, while Perevalov *et al* (мNкоюлю *et al*, 1998a, 1998b) consider 24. These studies lack statistical significance and are subject to selection bias. The studies of regulated firms could be considered invalid because of the absence of competitive markets.

In Russia, on the one hand, employees themselves have had to come to privatisation decisions, including a choice of the option of the privileges to be used. It is supposed that insiders are better informed of the true value of an enterprise, and this informational asymmetry could lead to selection bias. On the other hand, the absence of a developed stock market in Russia makes a real evaluation of a firm very problematic, almost impossible, especially by insiders. Moreover, Russian privatisation was a large-scale and very quick campaign. According to the Decree of the President of Russia No 721 of 1 July 1992, the majority of large and largest enterprises having over 1,000 employees and over 50 million rubles of fixed assets had to be, and were, privatised at the end of 1992-beginning of 1993. Moreover, if employees had not come to a decision by the set date, the enterprise would be compulsorily privatised. If in the world more than 15,000 state-owned enterprises were privatised from 1980P1992 (Kikeri *et al*, 1994), in Russia their number is more than 80,000 and most were privatised in 1992P1995. This seems to be a kind of a guarantee against selection bias.

However, the absence of selection bias in Russian privatisation is arguable and needs thorough consideration. Besides, selection bias

can take place in the process of the selection of a sample for study. For example, in some studies a sample is restricted to medium-sized firms, because "privatisation of the industrial 'dinosaurs' of the communist era raises special political and social problems" (Frydman *et al*, 1997). It reduces the usefulness of the conclusions, because large enterprises dominate Russian industry.

2.4. Methodology

There are two main approaches to an evaluation of the impact of privatisation on enterprise performance: the "synchronic" approach and the "historical" one (Frydman *et al*, 1997).

The "synchronic" approach is based on a comparison of the performance of state and private (or privatised) firms. Boardman and Vining (1989), La Porta and Lopez-de-Silanes (1997), Commander *et al* (1996), the experts of Saint Petersburg and Moscow (жор *et al*, 1997), Anderson *et al* (1997), Earl and Estrin (1997), Perevalov *et al* (мNкоолю *et al*, 1998a, 1998b), Dewenter and Malatesta (1998), and many others, use the approach in their studies.[2]

In the "synchronic" approach, it is supposed that the compared firms work under the same conditions: at the same time, in the same markets, and within the same environment. Nevertheless, it is practically impossible to find two identical enterprises, for example in metallurgy, especially if one of the two has to be a state-owned enterprise and the other a private one. There are always differences in capacity, equipment and in supply, every enterprise operates in its own economic, political and social environment, and every enterprise is at its own stage in the life cycle. There are also territorial differences, including differences in transition processes which are especially relevant for Russia, differences in management, and so on.

From this point of view, it seems to be more reasonable to compare the ex ante and ex post privatisation performance of the same enterprise, as the "historical" approach does. This approach was used, for example, by Megginson *et al* (1994), Earle and Estrin (1997), Perevalov *et al* (мNкоолю *et al*, 1998a, 1998b), Dewenter and Malatesta (1998), and by some other scientists (see Frydman *et al*, 1997).

---

[2] See Frydman *et al* (1997) for a summary of the literature.

At the same time, this approach is too straightforward. It permits only the measuring of changes in enterprise performance after privatisation, but fails to isolate the privatisation benefits from the impact of the other factors that have also influenced the performance results. For example, Dewenter and Malatesta (1998) show that the performance improvements after privatisation observed by Megginson *et al* (1994) reflect ordinary fluctuations related to the business cycle. The situation in Russia is redoubled by the fact that other complex transition processes, such as price liberalisation, the liquidation of the state system of planning and control, the commercialisation of the banking system and so on, have taken place since 1992 alongside privatisation and have distorted its effects. All these years, Russian enterprises have been operating under the conditions of economic crisis, with huge inflation, a slump in demand, inability to pay, the tax burden, and a lack of working capital. That is why it is rather difficult to isolate the real effects of privatisation.

A reliable study of the impact of privatisation on performance, as Frydman *et al* (1997) state, must combine the two approaches. Frydman *et al* compare state and private firms operating at the same time but use historical data in addition to synchronic comparisons in order to eliminate the possibility of selection bias. To establish that pre-privatisation selection bias does not affect post-privatisation results, they evaluate the pre-privatisation performance of privatised firms relative to state firms and show that, originally, they did not differ significantly from each other. However, in our opinion, it is not enough to compare the excess of revenues over labour and material costs in privatised and state firms in order to eliminate the possibility of selection bias because the compared firms can have, for example, different specialisations. It was of no importance in the administrative-command system before the reform, but specialisation can be very much the result in transition economies when the demand structure has dramatically changed. In the presence of selection bias, the model they used fails to produce consistent estimates of the effects of privatisation.

More appropriate is a later work by the same authors (Frydman *et al*, 1998), where a standard evaluation procedure for panel data treatment is used. As they remark, the fixed effects estimator used in the paper controls for the selection bias that creates a dependence between group-specific characteristics and the effects of privatisation. It is true on the assumption that the unobserved characteristics

correlated with the selection of firms for privatisation are indeed "fixed" (constant over time[3]) and are captured during the pre-privatisation period by the performance measures that are examined. However, the authors point out that this method does not take care of all potential forms of bias, such as would occur, for example, if better firms were to be selected for privatisation. They try to exclude this possibility directly, by contrasting the pre-privatisation performance of "managerially-controlled firms" with that of firms controlled by other types of owner.[4]

In our opinion, it is not the answer to the problem. Firstly, managers in Russia, for example, often control their firms indirectly, through dummy firms, and "officially" managerially-owned firms are only a part of the whole picture. Secondly, the managers' decision to privatise their enterprise does not mean that they will be able to become its largest shareholders.

Finally, according to the agency theory and the problem of moral hazard (Jensen and Meckling, 1976), the manager benefits from perquisites. The owner-manager will consume perquisites up to the point where the marginal utility from perquisite consumption no longer offsets the disutility from the decrease in the market value of the firm. The smaller the share of the equity owned, the smaller are the fractions of the costs from the decreased market value which must be borne, while the owner-manager is still able to take the full benefit from perquisite consumption. On the other hand, the smaller the share of equity owned, the greater is the threat of being fired. Therefore, the compulsion is to behave optimally, while the optimal share of equity can be less than what is needed to be the largest shareholder but sufficient not to be fired. When ownership of capital is dispersed between small shareholders, it is not necessary to own shares in the firm in order to concentrate the control of it. That is why the manager can be interested in the privatisation of the enterprise in order to exit from the control of the state, but not interested enough to become the largest shareholder.

---

[3] This supposition seems to us rather unrealistic.

[4] It should be noticed that Frydman *et al* (1998) classify a firm as "managerially controlled" when it is managerially-owned, i.e. managers are its largest shareholders. However, since the work by Bearle and Means (1932), a firm is considered manager-controlled when it has no major shareholder. We shall use the term "manager-controlled firm" in the generally-accepted meaning.

Therefore, the lack of studies on the impact of privatisation on enterprise performance in Russia, and the incompleteness of the methods for an evaluation of this impact, makes the work in this direction actual, pressing and promising.

3. THE OBJECTIVE OF THE STUDY, THE BASIC HYPOTHESES AND THE METHODOLOGY OF THE RESEARCH

The objective of the study is to provide empirical evidence on the impact of privatisation on the performance of large and medium-sized industrial enterprises in Russia. We will check empirically the general hypothesis that privatisation has promoted performance improvements, even though these improvements have been attenuated by the negative influence of the transition processes.

The more detailed hypotheses to be checked are as follows.

1. *Privatisation has a positive impact on a firm's ability to generate revenue growth*. Studies by Megginson *et al* (1994), La Porta and Lopez-de-Silanes (1997), Grosfeld and Nivet (1997), and Frydman *et al* (1997, 1998) support this hypothesis. Commander *et al* (1996) do not find a strong relationship between ownership changes and output and capacity utilisation in Russia.

2. *Privatisation leads to an increase in profitability*. Megginson *et al* (1994) and La Porta and Lopez-de-Silanes (1997) support the hypothesis with their empirical results. Dewenter and Malatesta (1998) do not find much evidence that privatisation itself increases a firm's profitability. They show that net income-based profitability measures improve after privatisation, but EBIT-based profitability measures do not. Frydman *et al* (1997) consider profits to be extremely volatile and subject to a number of accounting decisions in the short-term, especially with respect to costs, that bear little relation to long-term performance. Earle and Estrin (1997) also argue that profitability and efficiency may be poor measures of behavioural change in the short-run, because many types of restructuring may impose higher short-run costs. We have a rather long period in our sample in order to assess the long-term consequences of privatisation. However, to our mind, profit can hardly be considered to be the basic objective of Russian enterprises. The Russian tax system enforces enterprises to hide profit in order to

minimise taxes. Employees and managers are large shareholders and they are not interested in profit maximising because they have other channels of welfare improvement.

3. *Privatisation results in improvements in operating efficiency*. Megginson *et al* (1994), La Porta and Lopez-de-Silanes (1997), Anderson *et al* (1997), Frydman *et al* (1997), Dewenter and Malatesta (1998) empirically document the hypothesis. Earle and Estrin (1997) find a generally positive impact of shareholding on the labour productivity of Russian firms.

4. *Privatisation does not lead to reductions in employment*. The hypothesis is empirically supported by Megginson *et al* (1994) and Frydman *et al* (1997), and rejected by La Porta and Lopez-de-Silanes (1997). Commander *et al* (1996) show that the impact of privatisation on firms' employment behaviour in Russia is apparently weak. Earle and Estrin (1997) also find that the impact of shareholding on layoffs in Russian firms is very weak.

5. *Privatisation has a positive influence upon the level of workers' wages*. La Porta and Lopez-de-Silanes (1997) support the hypothesis in their study of privatisation in Mexico. A study by Commander *et al* (1996) shows that the influence of ownership upon changes in the wage rate is generally insignificant for Russian firms.

3.1. Performance evaluation

The performance of enterprises in Russia is subject to the processes of transition (price liberalisation, lowering of foreign trade barriers, liquidation of the state system of planning and control, disorganisation of production links, commercialisation of the banking system, etc.) that have taken place since 1992. Change of ownership is only one of these processes. Along with Frydman *et al* (1997), we shall try to separate the effects of transition and privatisation, but in another way[5].

We intend to use a set of panel data from industrial enterprises in the Sverdlovsk Oblast (Region) of Russia. The analysis of panel data is subject to one of the most active and innovative bodies of literature in

[5] Frydman *et al* (1998) use an approach similar to ours in their latest work published in 1998.

econometrics. As Greene (1995) remarks, time-series cross-sectional data can be used to examine issues that could not be studied in either cross-sectional or time-series settings alone. With panel data, one can model the heterogeneity across groups or units which is typical in microeconomic data. We shall use data on enterprise performance before and after privatisation in order to catch the effect of ownership changes. The panel structure of the sample gives the opportunity to control for individual (firm-specific) effects.

In the models for panel data, time effects are often viewed as "transitions" or discrete changes of state (Greene, 1995). It permits the division of the privatisation effect, specific to the change of ownership, and the transition effect, reflecting the significant downward pressure that transition processes in the Russian economy have put on enterprises.

Using fixed and random effects models (Johnston and DiNardo, 1997; Greene, 1995) will deliver the estimation for the equations.

The general form of the regression equations for the fixed effects model will be as follows:

$$y_{it} = \alpha_i + X_{it}\beta + \varepsilon_{it}, \quad (1)$$

where y is the value of the dependent variable for the cross-sectional unit (the firm) i at time t; X is the matrix of the values of the explanatory variables for unit i at time t; α is considered to be constant over time and specific to the ith firm

If the random effects model is used, it has the following structure:

$$y_{it} = \alpha_i + X_{it}\beta + u_i + \varepsilon_{it}, \quad (2)$$

where u is a random disturbance constant over time and specific to the ith firm.

However, as Greene (1995) remarks, the relevant distinction between the two models is not whether the effect is fixed or not. The distinction is whether the effect is correlated with the explanatory variables. In order to choose the right model, the Hausman specification test should be performed.

If our random effects model is correctly specified and u is uncorrelated with X, the subset of the coefficients that are estimated by the fixed-effects estimator and the same coefficients that are estimated by the random-effects estimator should not statistically differ.

3.2. Selection bias

The assumption of the exogeneity of privatisation can bring into question the results in that privatisation might not affect the performance of enterprises but, *vice versa*, performance could determine privatisation. This is a well-known selection bias problem. The most likely form of selection bias is that privatised firms perform better than state ones because they were simply better firms and were privatised for this reason. To evaluate the presence of selection bias of that kind, we will test for the effect of the performance of enterprises scheduled to be privatised on the likelihood of privatisation. We shall use conditional (fixed-effects) logistical analysis because our data are grouped and the likelihood can be calculated relative to each group. The fixed-effects logit model can be written as follows:

$$\text{Prob}\left(\text{PRIV}_i \Big/ \sum_{t=1}^{T_i} \text{PRIV}_{it} = k_{1i}\right) = F(X_i\beta)\,, \tag{3}$$

where PRIV equals 0 if enterprise *i* is a state-owned one in year *t*, and 1 if it is a privatised one, k_{1i} is the observed number of ones for the dependent variable in the ith group, *T* is the number of observations, and $F(\cdot)$ is a cumulative logistic distribution function.

3.3. Performance measures

The performance measures we are interested in are presented in Table 1.

As Frydman *et al* (1997) remark, *revenues* can be considered the best measure of the advantages of private ownership. Revenues seem not only to be less subject to manipulation and more transparent to an outside observer, but also more future-oriented and unpredictable on the basis of past history. Revenues are matters of entrepreneurial, risk-taking activity, even in mature economies. We intend to use the annual rate of the growth of real sales (revenue) of products, excluding income from any sales of assets. In calculating real sales, we deflate the revenue data using a regional producer price index.

As measures of profitability, two indicators are used, *profit margin* (*profit/sales*) and *costs per unit* (*costs/sales*). We use total profit, i.e. operating profit (profit resulting from the predominant activity of the

Table 1. The hypotheses to be tested; the studies where they have been tested already; and the indicators to be used in our study

Hypotheses to be tested	The studies where the hypotheses have been tested already	Indicators to be used
1. Privatisation has a positive impact on a firm's ability to generate revenue growth	Megginson et al (1994), La Porta and Lopez-de-Silanes (1997), Grosfeld and Nivet (1997), Frydman et al (1997), Commander et al (1996)	Real sales
2. Privatisation leads to increases in profitability	Megginson *et al* (1994), La Porta and Lopez-de-Silanes (1997), Frydman *et al* (1997), Earle and Estrin (1997), Dewenter and Malatesta (1998)	Profit margin (return on sales) and costs per unit
3. Privatisation results in improvements in operating efficiency	Megginson *et al* (1994), La Porta and Lopez-de-Silanes (1997), Anderson *et al* (1997), Frydman *et al* (1997), Earle and Estrin (1997), Dewenter and Malatesta (1998)	Sales per employee
4. Privatisation does not lead to employment reduction	Megginson *et al* (1994), Frydman *et al* (1997), La Porta and Lopez-de-Silanes (1997), Commander *et al* (1996), Earle and Estrin (1997)	Number of employees
5. Privatisation has a positive influence upon the level of workers' wages	La Porta and Lopez-de-Silanes (1997), Commander *et al* (1996)	Unit labour costs

firm) plus other revenue matched against other expenses of the firm, after depreciation but before taxes and interest. In our opinion, net income after taxes, as used by Megginson *et al* (1994) and La Porta and Lopez-de-Silanes (1997), is not suitable to the conditions of the Russian transition economy where taxes are changed

every year. Therefore in Russia, net income after tax is greatly influenced by government decisions and could not characterise how successfully a firm has operated. It seems more preferable to use net operating income, or earnings before interest and taxes (EBIT), because interest costs can introduce unwanted effects of the capital structure on the profit measure. However, firstly, in the conditions of falling demand, total profit seems to us more preferable than operating income, because it is a better characteristic of the entrepreneurial, risk-taking activity of managers. Secondly, in contradistinction with profits before tax, which are destined for those who are outside a firm, the structure of costs is used internally by managers. It is closed information unobtainable for research purposes. However, in order to clarify the effect of privatisation on the profit margin under the impact of the capital structure, we intend to control for debt scaled by revenues.

Costs per unit show the cost side of the operation. We use the cost of goods sold (including manufacturing costs) and operating expenses; therefore *costs per unit* provides information on the operating profit margin of a firm (*operating profit margin* = 1 P *costs per unit*). However, these costs also contain interest, and we use debt scaled by revenues as the control variable in order to exclude the effect of capital structure from the effect of privatisation.

Comparison of the two specifications helps to reveal the impact of privatisation upon other elements than operating profit.

Our primary measure of operating performance is *sales per employee*. Sales (deflated by the regional producer price index) per employee provide an estimate of labour productivity. This indicator is especially important. As Nickell (1996) reminds us, productivity growth is the cause of the "wealth of nations".

Number of employees (the growth rate of employment) can be used to analyse employment strategy under privatisation and to estimate if SOEs are indeed over-staffed.

Unit labour costs are a measure of operating performance (we use all kinds of payments to employees). At the same time, they permit the checking of the hypothesis that employees of SOEs are over-paid.

These indicators are those most commonly used as a firm's performance measures, and the majority of them were used in the studies mentioned above. The hypotheses to be tested; the studies

where they have been tested already; and the indicators to be used in our study are presented in Table 1.

We assume that the performance results of a firm are subject to the change of ownership on the one side, and the transition processes on the other. The conditions of economic crisis, huge inflation, a slump in demand, inability to pay, the tax burden, lack of working capital, etc. put significant downward pressure on performance results. We assume that privatisation changes the dynamics of the transition processes, and the change is the privatisation effect, which reflects the success or failure of the privatised enterprise in moderating the transition effect.

In order to capture the privatisation effect, we relate a firm's performance results to its ownership type. There is, however, a problem of timing: when can an enterprise be considered a privatised one? Dewenter and Malatesta (1998) define the privatisation date as the month when a firm's shares begin trading on a public stock exchange. This approach is not appropriate to Russia because the majority of the shares of a privatised enterprise in Russia can be sold to employees before they are traded on a public stock exchange. We use the date of approval of a firm's privatisation plan by the regional Committee for State Equity Management. The idea behind this is that, after approval, the enterprise officially exits from management by the state.

However, the date of approval of a privatisation plan can be considered a rather formal mark. The majority of researchers associate the moment of privatisation with the diminution of the state's shareholding past a certain minimal boundary. For example, Earle and Estrin (1997) define an enterprise as "state-owned" if the state holds at least 50% of its shares. Anderson *et al* (1997) consider a firm to be privatised when more than one-third of its shares have been transferred to private investors (thus, 66% of shares remain in state ownership). Frydman *et al* (1998) mean by a privatised firm one which is (partially or totally) privatised through the privatisation of a predecessor state-owned company in which the combined holdings of private parties gives them a blocking power. Private parties have a blocking power if they control a percentage of votes which is formally sufficient to block major decisions at the general shareholders meeting. (For Russian joint-stock companies, a blocking share is 25% plus one. Thus, even if the state holds up

to 75% minus one of the shares, an enterprise should be defined as "privately-owned".) La Porta *et al* (1998) say that a corporation has a controlling shareholder (ultimate owner) if this shareholder's direct and indirect voting rights in the firm exceed 20%, because this is usually enough to have effective control of a firm. They present evidence that, in the majority of cases, such ultimate owners are also part of the management of the firm. Mikkelson *et al* (1997) define a blockholder as the owner of 5% or more of outstanding ordinary stock.

The arbitrary nature of the definition of a dominant share stake brought us to a decision not to determine this dominant stake *a priori* but to analyse what influences a state stake has upon the performance of an enterprise. We separate state shareholding into several groups: 100% (enterprise is formally privatised, but the state has not yet begun to sell its shares); from 100% to 75% (absolute control); from less than 75% to 51% (majority control); from less than 51% to 25% (blocking control); from less than 25% to 5% (a blockholding permitting control in coalition with other shareholders); from less than 5% to 1% (merely a presence), and, finally, less than 1%.

We also disaggregate the average effect of privatisation into separate effects caused by the different privatisation methods (options of facilities for employees) which can be applied. It is a widespread belief that, in the environment of the post-communist transition, the fact of privatisation, with its concomitant depoliticisation and greater efficiency, is more important than the way in which firms are privatised (Anderson *et al*, 1997). Anderson *et al* find no significant differences in the effectiveness of privatisation methods in seven countries of central and eastern Europe. In Russia, however, methods of privatisation influence the initial structure of ownership and control in privatised enterprises (see, for example, Earle and Estrin, 1997).

There are three options of facilities for employees[6]. Option 1 provides employees with 25% of non-voting shares free of charge, up to 10% of voting shares by sale, and 10% of voting shares through an employee share fund; top managers can buy up to 5%

[6] There are some specialities in the privatisation of some food industry enterprises, for example, but they are not so great as to distort the whole picture.

of the voting shares. In choosing option 2, employees can buy 51% of the voting shares and an additional 10% of the shares through the employee share fund. In the case of option 3, a group of employees (as a rule, top managers) can buy 20% of the voting shares and other employees (including the aforementioned group) a further 20%. They can also later buy 10% of the voting shares through the employee share fund.

We distinguish also the buy-out of leased assets because in this case employees received 100% of shares. Many enterprises were initially privatised by a lease of assets without buy-out rights. After the beginning of mass privatisation, they were transformed into joint-stock companies and their employees were able to choose the option of the facilities for the privatisation of the residual state equity. That is why we consider also an option 1a, where a leased enterprise later chooses option 1, and option 2a, when option 2 was chosen later.

Of course, it is only the initial distribution of shares which could be changed significantly in subsequent years. Nevertheless, this initial distribution determines control in privatised firms and could influence the performance of privatised enterprises during the first years after privatisation.

In order to capture the dynamics of the effect of privatisation, we also use two other specifications. Firstly, we replace the privatisation dummy variable with one representing the length of the post-privatisation period of a firm. However, it helps us to catch only the linear annual effect of privatisation. That is why in the second specification we introduce four years after privatisation as independent dummy variables. They permit us to mark out annual positive or negative shifts in post-privatisation performance results.

The performance results may vary systematically for a variety of reasons. We control for firm size, industry affiliation, level of competition in the industry, and some others.

It is well known that the *size* of enterprises in eastern Europe was often not dictated by economic considerations, and, on average, they tend to be larger than those in developed countries (Kornai, 1992). Nevertheless, as it was shown by Frydman *et al* (1997), larger firms suffer more severely from the transition. The larger the firm, the more political support it used to have, and the less business justification was needed for its operation. Usually,

these firms were in a quasi-monopolistic position, and were less likely to be able to respond to a fast-changing environment. Many of them produced goods for export to the COMECON countries and lost their markets when the socialist system was crushed. Russian enterprises lost also their markets in the former republics of the Soviet Union. Large enterprises in Russia are over-burdened by out-of-date capital assets, while their overheads, in excess of those carried by other enterprises, make it difficult for them to compete against other firms in their own country, never mind those in the wider economic community.

There are different definitions of size categories in different countries. For example, Eurostat (The European Observatory for SMEs, 1993) distinguishes the following broad classes in the European Community: micro-enterprises (0P9 employees), small enterprises (10P99 employees), medium enterprises (100P499 employees), and large-sized enterprises (500 or more employees). We base our size categories on the current Russian definitions: small enterprises (up to 199 employees), medium enterprises (200P999 employees), large-sized enterprises (1,000P9,999 employees), and extra-large ones (10,000 or more employees).

Employment is an endogenous variable and is influenced by the performance results of the enterprise. However, we are not going to control for changes in enterprise size during the transition. We are interested only in the impact of the initial size of the enterprise, at the beginning of the period, upon its performance during the period. Therefore we divide enterprises into size groups according to their employment in 1992 and treat the corresponding dummy variables as exogenous.

We intend to control for *industry* (*sector*) *affiliation*. The problem of a role for the sectoral dimension in firms' adjustment to the transition is not yet clear. For example, Pinto *et al* (1993) and Estrin *et al* (1993) conclude that variations in firms' adjustment were not correlated with industrial sector. Grosfeld and Nivet (1997) find that there are firm-specific rather than sector-specific regularities in firms' reaction. However, Barbone *et al* (1996) find significant differences in the intensity of the adjustments across sectors. In the industry of the Sverdlovsk Region (as in Russian industry as a whole), serious structural changes have taken place since the transition. The share of the fuel and power industries,

monopoly industries, in total industrial output has increased significantly, as has that of export-oriented industries, ferrous and non-ferrous metallurgy. At the same time, mostly because of foreign competition, there has been the sharpest decline in production in machine-building (caused also by the reduction in the state's defence expenditure), as well as in consumer goods and in the food industries. Therefore, industry (sector) affiliation seems to be important in enterprise adjustment to the transitional processes in Russia. We treat industrial sector affiliation as exogenous because none of the examined enterprises has changed its sector affiliation during the period under consideration.

As we have mentioned earlier, competition is considered one of the most important factors influencing firm performance. We control for the *number of enterprises in the industry sector* as a proxy for the level of competition. La Porta and Lopez-de-Silanes (1997) consider industry to be competitive if it has at least 10 firms in it, and non-competitive otherwise. At the same time, Bresnahan and Reiss (1991) find that an increase in the number of firms operating in a market up to around five has significant effects in reducing market power. Nickell (1996) uses six: a company and five competitors in the market. We can use any one of the above-mentioned criteria without changing the results because the power industry and the fuel industry each have only four enterprises in the region, while the others have more than 10 enterprises. Of course, it provides a very rough estimation of the level of competition. Firstly, we use the number of enterprises in the industry in the region, thus neglecting competitors from other regions and abroad. Secondly, an industry with two firms can be very competitive if entry barriers are low and incentives to enter the product market are high, while a large number of firms in an industry can be consistent with very weak competition. Analysing the Soviet economy, Brown *et al* (1993) found that barriers to competition in Russia arose as the result of product markets that were highly segmented. However, in our study, the industries classified as non-competitive under the criterion of the number of firms, the power industry and the fuel industry, are indeed non-competitive ones because their enterprises are monopolistic in the regional market, and their entry barriers are very high.

There is also another problem. The number of enterprises in industry is endogenous and depends on the level of sunk costs and the degree of price competition. Moreover, in transition economies

it is likely that the number of rival firms will change in response to the transition shock (Konings, 1997). If the performance of firms in the industrial sector affects the number of firms in it, then the regressing of performance results against the number of firms is problematic. However, even though the number of enterprises in industrial sectors has indeed changed during the transition in our sample, none of the sectors has changed its competition group.

In order to control for the *processes of transition*, we introduce time dummies. They help to isolate the improvements in performance caused by privatisation from those that are the results of general changes in the economic environment (there were no such variables in the previous version of our study (мNNкоолою *et al*, 1999), which caused an overestimation of the effects of privatisation).

In our specifications for profit margin and costs per unit, we control also for the *inflation rate*. (We use a regional producer price index as the rate of inflation.) It is a well-known phenomenon that costs are underestimated and profits are overestimated when historical costs are used and the inflation rate is high. Of course, inflation is subject to the behaviour of enterprises. However, no one enterprise (except for monopolistic ones, although their prices are regulated) can determine inflation. We control for non-competitive industries, and this permits a consideration of the inflation rate as an exogenous factor.

We will estimate the following basic equations (model 1):

$$PERF_{ijt}=\alpha+\beta_1 PRIV_{it}+\beta_2 OTR_j+\beta_3 SIZE_i+\beta_4 T_t+\beta_5 COMP_j+\nu_i+\xi_{it}, \qquad (4)$$

where PERF is the analysed performance indicator; PRIV is a dummy variable representing the type of ownership (PRIV=1 if the firm was privatised in year *t* and 0 otherwise); OTR is a dummy variable representing the industry sector (OTR=1 if the firm belongs to the *j*th industry sector and 0 otherwise); SIZE are dummy variables representing the size of the firm; *T* are time dummies; and COMP is a dummy variable representing the degree of market power in the industry (COMP=1 if the industry has at least 5 firms in it and 0 otherwise).

To examine the trend of the increase in the performance level following privatisation, we use a specification (model 1b) with a variable representing the length (in years) of a post-privatisation period of a firm (DP):

$$PERF_{ijt}=\alpha+\beta_1 DP_{it}+\beta_2 OTR_j+\beta_3 SIZE_i+\beta_4 T_t+\beta_5 COMP_j+\nu_i+\xi_{it}. \qquad (5)$$

Another specification is used for estimating the non-linear effects of privatisation (model 1a):

$$PERF_{ijt} = \alpha + \beta_1 PRIV_{it} + \beta_2 OTR_j + \beta_3 SIZE_i + \beta_4 T_t + \beta_5 COMP_j + \\ + \sum_{k=1}^{4} \beta_{k+5} PrS_{itk} + \nu_i + \xi_{it}. \quad (6)$$

where PrS are dummy variables representing the number of years since privatisation and are equal to 1 in year t if it is the kth year ($k = 1$, 2, 3, 4) since the enterprise was privatised.

Thus, we can divide the privatisation effect into time-invariant (variable PRIV) and time-variant (variables PrS) models of behaviour.

We also use some other models. In model 2, the variable PRIV (4) was replaced by independent variables VAR1; VAR2; VAR1a; VAR2a; VAR3; and LEAS, reflecting the options of privatisation. We also introduce dummy variables PrS to the later model (model 2a). When we analyse the influence of the state shareholding on enterprise performance, we add to the variables of model 2 dummy variables representing the stake of the state in ownership (model 3) or in equity (model 4). To analyse the non-linear effects of privatisation, we add to model 3 and model 4 the dummy variable PrS (model 3a and model 4a respectively). Finally, we modify models 2, 3 and 4 by introducing a variable representing the length of a post-privatisation period of a firm (models 2b, 3b and 4b respectively).

To evaluate the presence of selection bias, we analyse how the performance of enterprises which are on the threshold of privatisation affects the probability of privatisation. We have panel data, as the groups are formed by enterprises, but we can also calculate the likelihood of privatisation, relative to each enterprise, for state and privatised observations with the help of the fixed-effects logit model:

$$\text{Prob}\left(PRIV_i \Big/ \sum_{t}^{T_i} PRIV_{it} = k_{1i} \right) = F(\beta_1 LNTSAL_{it} + \beta_2 SHARE_{it} + \\ + \beta_3 MARG_{it} + \beta_4 SEMPLE_{it} + \beta_5 WSALES_{it} + \beta_6 LNTEMP_{it}),$$

where PRIV equals 0 if an enterprise i is state-owned in period t and 1 if it is privatised, T is the number of observations for the ith enterprise, k is the observed number of ones for the dependent variable PRIV in the group i, and $F(\cdot)$ is a cumulative distribution logistic function. Other variables are described in Appendix A.

4. THE SAMPLE

The Sverdlovsk Oblast is one of the most industrially developed regions and provides 5% of the industrial production of Russia. The process of the privatisation of industrial enterprises, first of the large ones, was more rapid here than in the majority of other territories in Russia and in the Urals. In 1992P1993, more than 34% of all industrial enterprises privatised in the Urals were from the Sverdlovsk Oblast. By 1995, only 7.5% of all industrial enterprises in the Sverdlovsk Oblast were state-owned (and 7.8% in the Russian Federation), although they were larger than the average enterprise in Russia: they had 20.1% of all employees in industry (17.8% in Russia) and produced 12.2% of all industrial production (11.0% in Russia).

We have a panel of 198 randomly selected industrial firms for the period 1992P1996. 8 of them were excluded from the list since they lacked complete information for the whole period and 1 more because it was broken up in the process of privatisation. The data has been obtained from the Sverdlovsk Regional Committee of State Statistics.

The sample includes only enterprises that existed in 1991 and were state-owned (Table 2). 8 of the enterprises were not privatised during the period. Their performance results are used for comparison with those of privatised enterprises, alongside a consideration of the performance results of the state-owned enterprises before their privatisation.

The sample covers all the industrial sectors of the Sverdlovsk Oblast: the power industry; the fuel industry; ferrous metallurgy; non-ferrous metallurgy; the chemical and petrol-chemical industries; machine-building; the forestry industry; construction materials; consumer goods; the food industry; and others. For every enterprise, the data includes sales, the number of employees, total operating expenses, pre-tax profit, remuneration of labour, and some other indicators. All money measures are expressed in thousands of rubles in 1996, using the producer (industrial sector) price indices as deflators.[7]

[7] Usually, the consumer price index is used as the deflator. For example, Megginson *et al* (1994) use the consumer price index because it shows higher inflation than does the producer price index and, therefore, imparts a conservative bias. However, in Russia the producer price index shows higher inflation. We use the sectoral producer price indices instead of the industry-wide one in order to capture the changes in the physical amounts of production in each industry.

Table 2. Dynamics of privatisation in the sample

Type of enterprises	Number of enterprises in the sample				
	1992	1993	1994	1995	1996
State enterprises	146	28	14	10	8
Privatised enterprises, total	43	161	175	179	181
privatised by option 1	7	25	30	31	31
privatised by option 1a	2	3	3	3	3
privatised by option 2	19	92	98	98	100
privatised by option 2a	1	10	11	12	12
privatised by option 3	0	2	3	3	3
privatised by lease/buy-out	14	29	30	32	32
Total	189	189	189	189	189

The sample includes 28.8% of all the enterprises privatised in the industry of the Sverdlovsk Oblast during 1992P1996 (Appendix B, Table B.1). The share differs from 8.8% for other industries where 113 different enterprises were privatised, to 100% for sectors with only the one privatised enterprise (the power and fuel industries). The structure of the sample by sector and method of privatisation (option of facilities for employees) is presented in Table B.2 (Appendix B).

The majority (55.2%) of enterprises were privatised by option 2.[8] Lease/buy-out is in second place (17.7%) and option 1 in third (17.1%). 6.6% of enterprises were privatised by option 2a. Options 1a and 3 were used by 1.7% of enterprises in the sample. However, there are some differences between the sectors. In the power and fuel industries, all enterprises were privatised by option 1, while in the food and consumer goods industries, this method was not used at all. Almost half of enterprises in machine-building, and more than half in the chemical and petrol-chemical industries, were privatised by option 2. Option 3 was used only in the consumer goods sector. Lease/buy-out is most often used in ferrous metallurgy (31.8%), the food industry (31.6%), and the chemical and petrol-chemical industries (27.3%).

[8] John S. Earle and Saul Estrin (Earle and Estrin, 1997) have just the same share in their sample C about 60 per cent.

These differences can be clearly explained by the size of enterprises. As can be seen from Table 3, option 1 was used in the privatisation of the biggest enterprises: their sales, employment, and profits are 1.3-1.9 times above average. Enterprises privatised by option 1a were also the largest in terms of employment, but not in the other indicators. The bigger the enterprise, the more money employees need for privatisation. But option 1 provides employees with 25% of non-voting shares free of charge; they can also buy 10% of the ordinary shares at a price 30% below par value, and managers can buy voting shares at the price equal to the par value.

Table 3. Structure of the sample by method of privatisation (1996), %

	Option					Lease/ buy-out	Total
	1	1ö	2	2ö	3		
Number of enterprises	17.13	1.66	55.25	6.63	1.66	17.68	100.0
Sales	26.07	0.82	60.17	5.94	0.06	6.94	100.0
Profit	38.37	P1.88	38.77	13.55	0.10	11.09	100.0
Costs	25.26	0.91	61.64	5.54	0.06	6.59	100.0
Employment	26.06	2.16	56.77	6.62	0.15	8.23	100.0
Wages	20.96	1.27	62.17	6.81	0.10	8.70	100.0

Average-size enterprises are privatised by options 2 and 2a. In this case, 51% of ordinary shares can be sold to employees at a price that exceeds the par value by 1.7 times.

The smallest enterprises are privatised by option 3. It was determined by the State Programme of Privatisation of State and Municipal Enterprises in the Russian Federation in 1992 that option 3 could be used only for enterprises with up to 200 employees and 50 million rubles in fixed assets. In our sample, these enterprises are 20 times below average. It should be mentioned that option 3 is used rather rarely. This option requires that a group of managers should take responsibility andnot admit the bankruptcy of the enterprise. The group of managers should be very confident of the future of the enterprise and respected by employees, because employees choose the option. Probably, this is the reason why option 3 was used in our sample only by 3 enterprises, all in

Table 4. Dynamics of the basic indicators of the sample

Indicator	1992	1993	1994	1995	1996
Sales					
Mean, billion rubles	364.5	220.7	237.7	236.0	251.1
Dynamics of mean, %	100.0	60.6	65.2	64.8	68.9
Median, billion rubles	108.1	64.5	61.5	55.3	61.2
Dynamics of median, %	100.0	59.7	56.9	51.2	56.6
Share in industry revenues					
Mean, %	3.1	3.3	3.1	3.4	3.8
Dynamics of mean, %	100.0	105.3	100.3	109.6	123.2
Median, %	1.1	1.1	1.1	1.2	1.2
Dynamics of median, %	100.0	100.0	100.0	109.1	109.1
Profit margin					
Mean, %	38.8	36.3	19.7	23.4	P14.1
Dynamics of mean, %	100.0	93.6	50.6	60.1	P36.4
Median, %	24.9	31.1	18.1	19.6	7.7
Dynamics of median, %	100.0	124.8	72.8	78.4	30.9
Employment					
Mean, persons	3047	2888	2652	2445	2282
Dynamics of mean, %	100.0	94.8	87.0	80.2	74.9
Median, persons	1267	1206	1038	918	859
Dynamics of median, %	100.0	95.2	81.9	72.5	67.8
Sales per employee					
Mean, million rubles per employee	116.8	71.2	74.9	74.3	83.6
Dynamics of mean, %	100.0	60.9	64.1	63.6	71.6
Median, million rubles per employee	81.8	45.6	54.4	54.8	60.6
Dynamics of median, %	100.0	55.6	66.5	67.0	74.0
Unit labour costs					
Mean, %	13.6	17.6	15.1	16.4	25.6
Dynamics of mean, %	100.0	128.9	111.0	119.9	187.7
Median, %	9.3	13.2	13.7	13.1	14.1
Dynamics of median, %	100.0	142.1	148.3	141.8	151.8

the consumer goods industry, in which there was active demand for the products and for which there seemed to be continuous demand in the future. They were a fur company, a carpet firm and a sports-wear firm.

Privatisation by lease/buy-out began in 1990, and employees were obliged to acquire all the assets they leased at the end of the lease period. It was rather difficult, and lease/buy-out was not used for large enterprises. In our sample, such enterprises are 2.5 times below average.

For example, in 1996, 3,470 employees worked in an average enterprise from the sample privatised by option 1; 2,367 by option 2; 214 by option 3; and 1,076 by lease/buy-out.

The sample of enterprises makes a satisfactory coverage of the regional industry: it provides 49.1% of total sales in the industry in 1992 and 75.7% in 1996 (Table B.3, Appendix B). The share changes from 36.4% in the consumer goods industry to 99.8% in the fuel industry. 62.8% of all industrial employees worked in the enterprises in our sample in 1992 and 60.3% did so in 1996. This allows us to consider the sample as a representative one. The dynamics of the basic indicators of the sample is presented in Table 4.

The analysis was carried out with the help of STATA. The checklist of the variables used is presented in Appendix A.

5. RESULTS OF THE STUDY

5.1. Average effects of privatisation

The average effects of privatisation are estimated in models 1, 1a, and 1b (Tables C.1PC.5).

Revenue growth. Privatisation has a statistically insignificant time-invariant influence upon revenue growth (Table C.1). We failed also to find any linear trend increase (decrease) or non-linear post-privatisation effects in sales. At the same time, there was a considerable negative transition effect: a decrease in revenue by 43.8P46.3% in 1993, by 45.6P 51.5% in 1994, by 62.2P68.0% in 1995, and by 59.9P66.2% in 1996. Enterprises in the machine-building and consumer goods industries experienced a significant diminution in their real sales, as opposed to enterprises in the chemical and petrol-chemical industries and in the

construction materials industry, which showed a growth in revenues (RE estimators).

Employment. Privatisation does not have a statistically significant impact upon average employment (Table C.2). Employment is negatively influenced by the transition: a reduction by 14.4P14.7% in 1994, by 22.8P25.0% in 1995 and by 34.3P34.8% in 1996. Enterprises in the forestry and consumer goods industries significantly reduced employment.

Profit margin. The profit effect of privatisation is insignificant (Table C.3). The transition had a considerable positive effect on profit margin while the effect of the level of credits per unit of sales was negative.

Costs per unit of sales. As can be seen from Table C.4, privatisation has a strong one-off impact on the cost side of production, equal to a 0.12P0.15 ruble reduction per ruble of revenue (models 1 and 1a). The transition resulted in an increase in the indicator for the whole period. Enterprises in non-ferrous metallurgy, the fuel industry and the consumer goods industry saw increased costs, as opposed to enterprises in machine-building. Competition also causes an increase in costs. As could be expected, the level of credits per unit of sales had a positive influence on the indicator while the rate of inflation saw a *vice versa* effect.

Productivity of labour. There is no statistically significant influence of privatisation upon the productivity of labour (Table C.5). The transition seems to be the only factor that determines the productivity of labour, and its influence is negative. The negative shift in the productivity of labour caused by the transition was 43.8P43.9 million rubles (in 1996 prices) per employee in 1993, 39.2P39.6 million in 1994, and 40.0P42.4 million in 1995.

We have tried also to estimate an equation with unit labour costs as dependent variables, but the tests for models 1, 1a and 1b are not fulfilled. In Russian firms, wages and other payments to employees are not the only source of payment for labour, so we also tried another indicator of performance, a firm's total labour expenditure, including on indirect ones like expenses for social purposes per unit of revenue (unit total labour costs). Unfortunately, the results are just the same. It should be mentioned that estimations for these indicators are invalid also for all the other models used in our study.

Thus, models 1, 1a and 1b show that privatisation has an effect "on average" only on costs per unit of sales. However, the approach used in our research, as well as in many other studies, is too aggregated. Consequently, we tried to disaggregate the averages and to examine the effects of privatisation on firms taking different options of privatisation (models 2, 2a and 2b).

5.2. Effects of different options of privatisation

The results obtained by model 2a are presented in the same Tables C.1P C.5. As one can see, introducing different options of privatisation changes the whole picture.

Firstly, we find a statistically significant impact of some options of privatisation upon such indicators as revenue growth and employment, indicators that are not influenced by privatisation "on average". Disaggregation helps also to mark out a positive post-privatisation trend increase in productivity of labour equalling 10.8 million rubles (in 1996 prices) per employee annually (model 2b). However, when we used model 2a, we saw only a lagged effect in the 3rd year after privatisation (Table C.5).

Secondly, model 2a (the results from model 2b that are not presented are very similar) evidences that some options of privatisation are better (or worse) in a certain sense than others, and the effect is time-invariant. Option 1 decreases revenue growth by 30.7P33.1% and employment by 11.0% (Table C.2, RE estimator). Option 2 decreases costs by 0.11P0.13 rubles per ruble of revenue (Table C.4, RE estimator). Lease/buy-out also reduces costs by 0.11 rubles per ruble of revenue (Table C.4, model 2, RE estimator). If a firm is privatised by option 2a, it leads to revenue growth of 26.7P48.8% and a reduction in costs by 0.18 rubles per ruble of revenue (Table C.4, RE estimator).

The shortcoming of the approach used in models 1 and 2, however, is the rather formal character of the date of privatisation. As we mentioned earlier, we use the date of approval of a firm's privatisation plan by the regional Committee for State Equity Management because, after the approval, the enterprise officially exits from management by the state. The majority of researchers, however, consider a state shareholding to be more relevant. In order to analyse the effects of a state-held stake in ownership and equity, we used models 3 and 4 and their modifications.

5.3. Effects of a state-held stake in ownership and equity

Revenue growth. As in model 2, there is a time-invariant negative effect of privatisation upon revenue growth for option 1 and a positive effect for option 2a. Model 3 also shows a statistically significant negative influence of an ownership stake held by the state, but only in three cases: when the stake is from 1 to 5% (FE estimator) or from 5 to 25% (RE estimator), and when it is from 75 to 100% (Table C.6). The effect is considerable: revenue decreases by 39.7% (the stake is 1P5%) or by 15.2% (the stake is 5P25%) and by 31.3P34.4%, when the stake is from 75 to 100%). We found exactly the same effect when we analysed the role of an equity stake (in ordinary shares) held by the state (model 4).[9]

Employment. When an ownership or equity stake held by the state is from 5 to 25%, it causes a statistically significant reduction in employment by 8.2P10.0% (Table C.7). Model 4 confirms also that option 1 leads to employment reductions (RE estimator).

Profit margin. As was mentioned above, we failed to find any effect of privatisation upon profit margin "on average". However, we find that profit decreases by 0.19P0.22 rubles per ruble of revenue where there is a state-held stake in ownership (equity) between 5% and 25%, and by 0.20P0.23 rubles per ruble of revenue if the stake is from 25% to 51% (Table C.8).

Costs per unit of sales. Models 3 and 4 confirm that options 2, 2a and lease/buy-outs reduce costs per unit of sales (Table C.9, RE estimator). Model 3 demonstrates also that a state ownership stake decreases costs by 0.13 rubles per ruble of revenues when it is from 51 to 75%, but increases costs by 0.10P0.18 rubles per ruble of revenues when it is from 25 to 51%. When a state equity stake is from 25 to 51%, it increases costs by 0.11 rubles per ruble of revenues. The transition has a negative impact upon sales per unit during the whole period.

---

[9] We have to differ between the share of the state in ordinary shares and in votes, because when the state has more than 20% in equity, only 20% of state-owned shares are considered to be voting ones. When we use T a stake in ordinary shares", we examine the real stake of the state in voting rights because this determines the control rights that it has.

Labour productivity. Models 3 and 4 provide no evidence that either a state stake or privatisation options affect labour productivity. However, model 4 confirms a lagged positive effect of privatisation: labour productivity increases by 32.6 million rubles per employee (in 1996 prices) in the third year after privatisation.

6. DISCUSSION OF THE RESULTS

Thus, our study provides evidence that *the privatisation of industrial enterprises by itself "on average" does not produce performance improvements, except in costs per unit of revenue and, to some extent, in productivity of labour*. We failed to find time-invariant effects of privatisation, a post-privatisation linear trend increase (decrease), or nonlinear (lagged) effects, for all the other performance measures. These results are in contradistinction with the above-mentioned majority of the empirical studies of privatisation in different countries where, as a rule, privatisation has had a statistically significant positive influence on the performance of firms. However, this means only that privatisation in Russia, though in any case it is a transfer of property rights from the state to the private sector, is a heterogeneous process that needs more detailed analysis.

This idea was supported when we revealed that *some of the options of privatisation do influence the performance of privatised enterprises, but the influence is not always positive*. It means that some of the options of privatisation are better (worse) in a certain sense than others and produce time-invariant effects. For example, option 1 depresses revenue growth and reduces employment. Option 2 and lease/buy-outs reduce costs per unit of revenue. Option 1a shows no statistically significant effect at all. Option 2a considerably decreases costs per unit of revenue and is the only one that increases revenue growth.

It is obvious that this effect is determined not by the options but by the ownership structure to which the options lead. The effect is time-invariant; it means that the initial ownership structure is relevant. Unfortunately, we do not have information on ownership structure. It is interesting, however, that the options with wider possibilities for managers to obtain control over the enterprise after privatisation demonstrate a more obvious positive effect. These are: option 2, which

permits managers to buy a part of 51% of the ordinary shares intended for employees; lease/buy-outs, where managers can have a large equity stake; and option 2a, where managers can have a large equity stake by leasing the enterprise and using all the possibilities mentioned above after the selection of option 2.[10] (In our study, good results are also shown by option 3, but the small amount of enterprises where the option was used did not permit us to make any statistically significant inferences about it.)

Option 1 seems to be the worst. Probably, this fact can be explained by the considerable dispersion of shares among insiders at such firms and by the interests of the owner-managers. In order to concentrate share ownership, the managers could be interested in stimulating employee-owners to retire and sell their shares.

As one can see, the behaviour of enterprises privatised by option 1 is different from those privatised by option 1a, while those privatised by option 2 are also different to those privatised by option 2a. It means that the generally-accepted unification of those enterprises privatised via options 1 and 1a, and by options 2 and 2a, can seriously distort the results of the study.

As we have found, an ownership or equity stake held by the state usually does not play any role. However, if the state has a blockholding of between 5% and up to 25% of ownership (or equity), it negatively influences revenue growth, employment and profit margin. When the state has blocking control (from 25% to less than 51%), it suppresses profit margin and increases costs per unit of sales. This is a real drop in performance, and it takes place only for the above-mentioned sizes of state share. (When the size of the state's stake is from 51 to 75%, we found a reduction in costs per unit of revenue). In our opinion, this could be the confirmation of the fact that, when the state retains a significant share stake but loses majority control and, especially, blocking control, there are no new shareholders that have a sufficient blockholding to monitor the managers properly, and the latter can follow their own objectives at the expense of other shareholders (moral hazard).

---

[10] Earle and Estrin (1997) found that, relative to firms following option 2, firms following option 1 tend to have more concentrated outside ownership and firms following the lease-buyout method tend to have less. In our opinion, the more concentrated is the internal ownership, the higher is the managersX stake.

All cases of the size of the stake held by the state are compared to the case when an enterprise is privatised but its shares have not yet begun to sell. That is why the corporatisation of a state-owned enterprise, i.e. its transformation into a joint-stock company without the sale of shares, is not worse than its privatisation and even better than the case when the share of the state is retained at 5 to 51%.

It should be noted that these privatisation options turn out to be statistically significant also in the models where the effect of a state stake in ownership and equity is analysed. It confirms our conclusion that the structure of private ownership is important in reality, while the privatisation options substitute for it in our study.

Our results partly support the conclusions of Frydman *et al* (1998) about the passivity of the state as a shareholder. The state as a partial owner is often considered temporary, passive and prepared to let other owners take control and, even with respect to enterprises in which the state is the sole owner, neglect is often the rule. The state as a partial owner can free-ride on the efforts of other owners, and the firms controlled by the state as the sole owner suffer from the absence of monitoring. In the absence of monitoring, enterprises are controlled by insiders but in Russia the situation does not change even when the state shares have been sold, because Russian privatisation conveys property rights to enterprise insiders. However, the detected drop in performance when the state loses the majority and blocking control in a firm could be considered as the evidence of the disciplined role of the state's stake, if it is large enough. The state as a controlling shareholder seems to be more preferable than the absence of any controlling shareholder at all.

According to our study, a share of the state in ownership seems to be as important for enterprise performance as its share in equity (in ordinary shares). This conclusion is in contradiction with the generally-accepted view that control rights are relevant. It appears to be caused by the peculiarities of privatisation in Russia. According to Russian privatisation laws, if the share of the state in equity is more than 20%, only 20% of the state-owned shares can be ordinary ones. The residual state-owned shares are considered to be privileged ones (so-called "type B" shares), and they are converted into ordinary shares after sale. Thus, the stake of the state in enterprise control is artificially limited and subject to sharp changes. For example, if the state owns 90% of the equity, it means that its real stake in terms of voting rights

is 66%. If only 20% of the shares are sold additionally, the state's voting stake will be reduced to 33%. It makes control in mixed state-private enterprises very unstable and sensitive to the sale of small blocks of shares. From this point of view, a stake in ownership can be more preferable for private shareholders as it is more unbiased and stable.

We have found performance improvements caused by privatisation, but not for all the performance measures analysed.

Many researchers find *revenue growth* to be the most pronounced result of privatisation. We failed to find a time-invariant, linear trend or non-linear effect of privatisation "on average" upon revenue growth. Moreover, disaggregating the effects of privatisation, we found that only option 2a was positively related to the indicator. At the same time, option 1 and certain stakes of the state in ownership (equity) suppressed revenue growth.

Thus, our results do not support the hypothesis that privatisation has a positive impact on a firm's ability to generate revenue growth.

Commander *et al* (1996) and Earle and Estrin (1997) show that the impact of privatisation on firms' *employment* behaviour in Russia is apparently weak. Our study also demonstrates that privatisation "on average" does not have any influence on employment. At the same time, we found that option 1, as well as a state ownership or equity stake in the range 5% to 25%, are strongly associated with employment reductions.

Employment reductions seem to be quite "natural" given the output drop during the transition and the high level of over-employment under which state-owned enterprises operated before they were privatised. The hidden unemployment in Russian industrial firms, where employees have reductions in hours worked, involuntary, unpaid leaves of absence, and comparatively low wages which are paid with many months delay, forces employees to retire. New employees are not hired, because they are not necessary under conditions of a drop in output. However, this is a general tendency. Why is this more typical for firms privatised by option 1? It seems to support the *political view* about the effectiveness of privatisation. Political interference in a state-owned firm results in excessive employment but, after privatisation, overemployment is sharply reduced in order to increase efficiency. This should be true for all privatised firms, but does not always take place.

In our opinion, one more explanation is possible. Owner-managers in the firms privatised by option 1 could be more interested in employment reductions because this option affords managers fewer opportunities for obtaining significant stakeholdings in their firms (initially they can have only 5% and a small part of the 20% of ordinary shares intended for employees.) When employees retire, they often sell the shares. As a rule, owner-managers organise dummy firms under their control to buy the shares. Therefore, employment reductions help managers increase their shareholding.

Concerning the reduction in employment when the state has an equity stake of 5% to 25%, we have mentioned already that, when the state keeps a significant shareholding but loses blocking control, other shareholders do not have a sufficient stake to monitor the managers properly, and the latter can follow their own objectives. Reductions in employment, helping managers to increase their shareholding, seems to be one of these objectives.

Thus, we only partly support the hypothesis that privatisation leads to employment reductions.

Analysing the relationship beween privatisation and *profitability*, we failed to find any effect of privatisation "on average" on profit margin. Moreover, we found a negative influence of a state-held stake when it is from 5% to 51%. At the same time, there is a strong positive (reducing) effect of privatisation on costs per unit of sales. Taking into account that, firstly, a reduction of costs per unit of sales is identical to growth in operating profit margin and that, secondly, profit margin can be presented as the sum of the operating profit margin (*operating income/sales*) and the profit margin on the firm's other activities ((*other revenue*P*other expenses of the firm*)/*sales*), we can conclude that privatisation caused a significant growth in operating profit margin and a decrease in the other incomes of the firm not related to its predominant activity. This effect is almost entirely caused by options 2, 2a and lease/buy-outs.

To a certain extent, this fact can be explained by the concealing of profits to reduce the tax burden, as Russian firms used to do. Managers and other employees are large shareholders, and they are not interested in profit maximising because they have some other possibilities for welfare improvement. Our results are in line with Pagano *et al* (1997), who show that the post-IPO (initial public offering) decline in profitability is subject to moral hazard when controlling shareholders

have a greater incentive to extract private benefits at the expense of minority shareholders.

Thus, the hypothesis that privatisation leads to increases in profitability could not be supported. At the same time, privatisation has a statistically significant positive impact upon operating profitability.

According to Earle and Estrin (1997), shareholding has a generally positive impact on the labour productivity of Russian firms. We also find a positive linear trend increase in the productivity of labour after privatisation, or a lagged effect of privatisation. It means that Russian firms did begin restructuring, but that they had needed a lot of time (three years after privatisation) to do so.

Thus, our study supports the hypothesis that privatisation results in improvements in operating efficiency, although these improvements are not very significant and have a considerable time lag.

In line with Commander *et al* (1996), we could not find any influence of privatisation upon the *level of workers' wages*, at least, upon unit labour costs and unit total labour costs. These results are inconsistent with the prediction of the *social view* that the burden of restructuring costs would fall upon employees through wage cuts or reduction of expenses on social development.

We could also not support the conclusion by Frydman *et al* (1997) that larger firms suffer more strongly from the transition. We did not find any evidence that the *size* of a firm had any impact on its performance.

Competition does not seem to play an important role in firms' performance results. However, competition does increase costs per unit of revenue (Table C.4, models 1 and 1a, RE estimators) and decreases labour productivity (Table C.8, model 4a, RE estimator). These results contradict the findings by Nickell (1996) that competition has a significant positive effect on productivity growth. La Porta and Lopez-de-Silanes (1997) showed greater reductions in costs per unit of sales in the non-competitive sector than in the competitive one in Mexico; this result is consistent with our findings. At the same time, they failed to find any influence of competition upon labour productivity. It should be mentioned that Willig (1987) presents a model in which he demonstrates that increased competition raises managerial effort and efficiency only if the demand elasticity effect dominates the demand reduction effect. It could be an explanation why in our study, under conditions of falling demand, increased competition does not cause performance improvements.

In line with Barbone *et al* (1996), we show also that there are significant differences of adjustment across *industrial sectors*. For example, enterprises in machine-building reduced revenues, productivity of labour and costs per unit of sales. If enterprises belong to the chemical and petrol-chemical industries or to construction materials, they had revenue growth and a decrease in labour productivity. Enterprises in the fuel industry increased costs per unit of sales. Enterprises of non-ferrous metallurgy increased costs per unit of sales and decreased labour productivity. Enterprises in the power industry had a decrease in costs per unit of sales and an increase in labour productivity. Enterprises in the consumer goods industry decreased sales, employment, labour productivity and costs per unit of sales. The forestry industry decreased employment and labour productivity.

7. SELECTION BIAS

Our study was conducted under an assumption of the exogeneity of privatisation. However, if enterprises are privatised because they have better performance, the results obtained can lead to a misinterpretation of the relationship between privatisation and performance. The choice of privatisation option could also be endogenous. Employees and managers choose from a number of privatisation options and their choice could be influenced by a number of factors. A reasonable hypothesis would be that these factors include the past and the expected performance of the firm.

To evaluate the presence of selection bias, we present a series of estimates of determinants on the likelihood of privatisation, obtained with the help of conditional (fixed-effects) logistic regression (Table 5).

As independent variables, we use the firm's performance results studied above. The performance results do influence the probability of being privatised. An increase of the share in industry revenue plays the most important role in the probability of privatisation. Firms with decreasing employment, profit margin, revenue and productivity of labour are most likely to be privatised. At the same time, costs per unit of revenue, unit labour costs, and unit total labour costs do little to influence the probability of being privatised.

We obtained also some interesting results for various options of privatisation. The reasons for option selection seem to be quite different.

As can be seen, the probability of being privatised by option 1 is determined by reductions in employment and profit margin. If a firm has a diminishing profit margin, employment and labour productivity, but a growing share in industry revenue, the likelihood of privatisation by option 2 increases. Enterprises privatised by option 2a, as a rule, have an increasing share in industry revenue but decreasing labour productivity before privatisation. (As the choice of privatisation variant seems to be endogenous, the results from the previous section regarding the relationship between privatisation variant and performance should be treated with some caution.)

It is quite opposite to the findings of Anderson *et al* (1997) that, in Poland, the firms included in the mass privatisation programme began to show rapid improvements in profitability two years before they were formally privatised at the end of 1995. Their explanation for this is that managers improved performance because they expected to be held accountable by the future new owners. Dewenter and Malatesta (1998) also present empirical evidence for 63 firms from different countries that profitability improves during the three years before privatisation. They suggest that governments efficiently restructure at least some firms before selling them.

How can our results be interpreted? Obviously, a firm with an increasing share of the industry looks a more preferable candidate for privatisation. Nevertheless, why does the worsening of performance results also play so important a role in the likelihood of privatisation?

To obtain a possible explanation, let us look at some findings concerning the performance results of companies that go public. Such companies are already private ones before an IPO, but they change concentrated ownership into a dispersed one.[11] This makes the process of the initial public offering rather similar to privatisation, where over-concentrated state ownership is changed into dispersed private ownership.

Jain and Kini (1995) show that operating profitability tends to decline after going public and suggest that the decline in performance is explained at least in part by poorer incentives for managers. Mikkelson *et al* (1997) report that operating performance falls significantly in the first ten years after going public, though it is not related to managers' incentives. They show that the difference in performance seems

[11] For example, in Italy the average firm has only 3 shareholders (the median) before an IPO and 3,325 after it (Pagano *et al*, 1997).

Table 5. Determinants of the probability of being privatised

Independent variables	Dependent variables			
	Priv		Var1	
	Coef.	P>|z|	Coef.	P>|z|
marg	P3.512***	0.000	P8.096**	0.024
csales	P.183	0.641	3.984	0.145
sempl	P.000**	0.040		
wsales	2.431	0.259		
share	13.870***	0.010	3.303	0.424
eff	P1.973	0.255		
lntsal	P2.262***	0.000		
lntemp	P7.208***	0.000	P26.929***	0.008
Log Likelihood	P104.050		P12.156	
	chi2(8) = 262.44 Prob > chi2 = 0.0000		chi2(4) = 61.25 Prob > chi2 = 0.0000	
Pseudo R2	0.5994		0.7158	
Number of obs	690		120	
Independent variables	Dependent variables			
	Var2		Var2a	
	Coef.	P>|z|	Coef.	P>|z|
marg	P3.384***	0.004	P18.026	0.144
csales	P2.091	0.273	P23.511	0.121
sempl	P.000**	0.016	P.000*	0.064
wsales	3.340	0.479	225.697	0.111
share	204.002***	0.000	523.415*	0.051
eff	P2.254	0.583	P78.552	0.132
lntsal	P2.234	0.111	7.226	0.248
lntemp	P11.316***	0.000	P13.348	0.127
Log Likelihood	P33.011		P5.974	
	chi2(8) = 203.02 Prob > chi2 = 0.0000		chi2(8) = 26.23 Prob > chi2 = 0.0010	
Pseudo R2	0.7546		0.6870	
Number of obs	405		55	

* C significant at the 10% level, ** C significant at the 5% level,
*** C significant at the 1% level.

attributable to factors related to the sale of shares by the current holders, who may attempt to time their equity sales to follow favourable performance or to precede a decline in performance. Pagano *et al* (1997) establish reductions in profitability, investments and financial leverage, which appear to persist beyond the first three years after the initial public offering. They show that the post-IPO decline in profitability is subject to adverse selection (companies go public when profitability is about to decline permanently) or to moral hazard (controlling shareholders have a greater incentive to extract private benefits at the expense of minority shareholders).

These suppositions could be suitable in our case. In Russia, the state, as a sole owner of industrial enterprises, was eager to sell them all, except for some which are prohibited from privatisation. Moreover, the state tried to accelerate the process of privatisation by simplifying the procedure, providing positive incentives such as considerable privileges for employees and a clear closing date when voluntary privatisation was over. Nothing was done to restructure enterprises before privatisation (as it was in the study by Dewenter and Malatesta, 1998). However, not the owner (the state) but employees (managers, firstly) were the ones who really came to a decision on privatisation. If they did not want privatisation, they sought hard to delay it, including entering their enterprise on a list of enterprises prohibited from being privatised. That is why the decision to be privatised seems to be subject to adverse selection. However, contrary to the findings of Mikkelson *et al* (1997) and Pagano *et al* (1997), Russian enterprises appeared to be privatised not when profitability was about to decline but after the decline, and after the decline not only of profitability but also of all the important indicators of performance.

In contrast to Poland (Anderson *et al*, 1997), Russian managers were not afraid of future new owners because the Russian model of privatisation confers on insiders control over privatised firms. As Frydman *et al* (1998) note, it is said to be a common practice in post-communist countries that those who want to acquire a firm which is to be privatised attempt, by fair means or foul, to assure that its pre-privatisation performance is as poor as possible, so that they can buy it at a lower price. This supposition is not relevant to our study. If it were so, we would not be able to find any improvements in performance results after privatisation, because we define the year of privatisation as the year when a firm's privatisation plan was approved. Usually in

this year, the shares of the privatised firm were not yet being traded and, in some cases, it took several years to begin the sale. One of the more probable explanations could be the desire of managers to force employees to come to a decision to privatise the enterprise. Employees seemed to be forced into privatisation by worsening performance results when exit out of state management seemed to be the only hope.

However, we do not think this is the case. In Russia, mass privatisation began only in 1992 and managers of the enterprises privatised in 1992P1993 (88.9% of all the privatised enterprises in our sample) had no time to reduce their performance in the foregoing years. The worsening results seem to us to be the quite natural consequences of the disintegration of the planned communist system, the disruption of previous production links and the transition to a market economy, when industrial enterprises were thrown into self-determined work. (Konings and Walsh (1999), for example, show that, for firms which existed under central planning in Ukraine, disorganisation in production links constrains employment and productivity growth during the transition process to a market economy.) These worsening results change the direction of rent-seeking behaviour by firm managers and stimulate managers for privatisation. This supposition is supported by the fact that an increasing share of industry revenue is the most important determinant on the probability of enterprise privatisation (and it shows the potentialities of the firm), although many other significant indicators also deteriorated.

Thus, selection bias seems to exist in our sample, but it is negative selection bias C not the better enterprises are chosen for privatisation but those with poorer performance C which obviously handicaps the impact of privatisation.

8. PRIVATISATION POLICY ADJUSTMENT CONCLUSIONS

There are several privatisation policy adjustment conclusions that could be made on the basis of the results of the study:

- In spite of all its shortcomings, privatisation has a positive effect upon the performance of Russian enterprises and should continue as the preferred course of action.

- To have improvements in the effectiveness of state-owned enterprises, the state could corporatise even some of the enterprises which are now prohibited from being privatised, i.e. transform them into joint-stock companies but preserve 100% of the shares in state ownership, because the mere fact of privatisation is important.

- In order not to aggravate the performance of privatised enterprises because of fears of losing control over managers, the state should keep more than 51% of shares in ownership or should sell sufficient shares to diminish its stake below 5%. The latter should help to ensure new shareholders having sufficient stakes to monitor managers properly.

- It seems preferable to reduce the application of option 1, which produces a negative impact upon firms' performance, and to broaden the use of options 2, 2a, and lease/buy-out (good results are also shown in our study by option 3, but the small amount of enterprises where the option was used did not permit us to make any statistically significant inferences about it.)

APPENDICES

Appendix A. List of regression variables

1. *Dependent Variables: Performance Measures*

All performance money measures are calculated in constant 1996 l prices

lntsal:	logarithm of annual rate of revenue growth
lntemp:	logarithm of growth rate of employment
marg:	ratio of pre-tax profits to sales (profit margin)
csales:	ratio of operating expenses to sales (costs per unit of revenues)
sempl:	ratio of sales to total number of employees (productivity of labour)
wsales:	unit labour costs (ratio of wages to sales)
eff:	unit total labour costs (ratio of wages, all other payments to employees, and expenses for social development to sales)

2. Independent Variables

priv	= 1 if enterprise is a privatised one in year t, 0 otherwise
var1_	= 1 if enterprise is a privatised one by option 1 in year t, 0 otherwise
var2_	= 1 if enterprise is a privatised one by option 2 in year t, 0 otherwise
leas	= 1 if enterprise is a privatised one by lease/buy-out in year t, 0 otherwise
var1a_	= 1 if enterprise is a privatised one by option 1a in year t, 0 otherwise
var2a_	= 1 if enterprise is a privatised one by option 2a in year t, 0 otherwise
otr1	= 1 if enterprise belongs to ferrous metallurgy, 0 otherwise
otr2	= 1 if enterprise belongs to non-ferrous metallurgy, 0 otherwise
otr3	= 1 if enterprise belongs to power industry, 0 otherwise
otr4	= 1 if enterprise belongs to fuel industry, 0 otherwise
otr5	= 1 if enterprise belongs to machine-building, 0 otherwise
otr6	= 1 if enterprise belongs to chemical and petrol-chemical industry, 0 otherwise
otr7	= 1 if enterprise belongs to forest industry, 0 otherwise
otr8	= 1 if enterprise belongs to construction materials industry, 0 otherwise

otr9	= 1 if enterprise belongs to consumer goods industry, 0 otherwise
otr10	= 1 if enterprise belongs to food industry, 0 otherwise
otr11	= 1 if enterprise belongs to other industries
size2	= 1 if it is a medium-size enterprise, from 200 to 999 employees in 1992, 0 otherwise
size3	= 1 if it is a large enterprise, from 1000 to 9999 employees in 1992, 0 otherwise
size4	= 1 if it is an extra-large enterprise, more than 10000 employees in 1992, 0 otherwise
comp	= 1 if industry has at least 5 firms in it, 0 otherwise
kred	debt-to-sales ratio (credits per unit of sales)
infl	annual inflation rate
gol1_	=1 if share of the state in equity is less than 1%, 0 otherwise
gol2_	=1 if share of the state in equity is from 1% to less than 5%, 0 otherwise
gol3_	=1 if share of the state in equity is from 5 %to less than 25%, 0 otherwise
gol4_	=1 if share of the state in equity is from 25% to less than 51%, 0 otherwise
gol5_	=1 if share of the state in equity is from 51% to less than 75%, 0 otherwise
gol6_	=1 if share of the state in equity is from 75% to less than 100%, 0 otherwise
gol7_	=1 if share of the state in equity is 100%, 0 otherwise
ust1_	=1 if share of the state in ownership is less than 1%, 0 otherwise
ust2_	=1 if share of the state in ownership is from 1% to less than 5%,0 otherwise
ust3_	=1 if share of the state in ownership is from 5% to less than 25%, 0 otherwise
ust4_	=1 if share of the state in ownership is from 25% to less than 51%, 0 otherwise
ust5_	=1 if share of the state in ownership is from 51% to less than 75%, 0 otherwise
ust6_	=1 if share of the state in ownership is from 75% to less than 100%, 0 otherwise
ust7_	=1 if share of the state in ownership is 100%, 0 otherwise
PrS1_	=1 if it is the first year after privatisation, 0 otherwise
PrS2_	=1 if it is the second year after privatisation, 0 otherwise

PrS3_	=1 if it is the third year after privatisation, 0 otherwise
PrS4_	=1 if it is the fourth year after privatisation, 0 otherwise
T93	=1 if it is 1993, 0 otherwise
T94	=1 if it is 1994, 0 otherwise
T95	=1 if it is 1995, 0 otherwise
T96	=1 if it is 1996, 0 otherwise

Appendix B

Table B.1. Dynamics of privatisation in the industry of the Sverdlovsk Oblast

Industrial sector	Number of privatised enterprises									
	1992		1993		1994		1995		1996	
	Sample	Total industry	Sample	Total industry	Sample	Total industry	Sample	Total industry	Sample	Total industry
Ferrous metallurgy	3	6	21	21	22	26	22	27	22	28
Non-ferrous metallurgy	0	2	15	15	20	21	20	22	20	24
Power industry	0	0	1	1	1	1	1	1	1	1
Fuel industry	0	0	0	0	0	1	1	1	1	1
Machine-building	4	19	40	92	49	158	51	171	51	178
Chemical and petrol-chemical industry	0	4	10	10	11	12	11	13	11	13
Forest industry	0	13	15	44	17	88	17	92	17	97
Industry of construction materials	1	14	14	30	17	45	18	47	18	48
Consumer goods industry	1	18	9	39	11	43	11	49	11	50
Food industry	1	7	14	32	19	65	19	72	19	75
Other	0	20	7	79	8	106	8	111	10	113
Total	10	103	146	363	17	566	179	606	181	628

Table B.2. Structure of the sample by sectors and methods of privatisation (a share of the method in the sector and a share of the industry in the option), %

Industrial sector	Methods of privatisation						
	Option 1	Option 1a	Option 2	Option 2a	Option 3	Lease-buyout	Total
Ferrous metallurgy	13.6 9.7	9.1 66.7	40.9 9.0	4.5 8.3	0.0 0.0	31.8 21.9	100.0
Non-ferrous metallurgy	5.0 3.2	0.0 0.0	80.0 16.0	5.0 8.3	0.0 0.0	10.0 6.3	100.0
Power industry	100.0 3.2	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	100.0
Fuel industry	100.0 3.2	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	100.0
Machine-building	35.3 58.1	0.0 0.0	47.1 24.0	3.9 16.7	0.0 0.0	13.7 21.9	100.0
Chemical and petrol-chemical industry	18.2 6.5	0.0 0.0	54.5 6.0	0.0 0.0	0.0 0.0	27.3 9.4	100.0
Forest industry	5.9 3.2	0.0 0.0	76.5 13.0	5.9 8.3	0.0 0.0	11.8 6.3	100.0
Industry of construction materials	0.0 0.0	5.6 33.3	44.4 8.0	27.8 41.7	0.0 0.0	22.2 12.5	100.0
Consumer goods industry	27.3 9.7	0.0 0.0	36.4 4.0	0.0 0.0	27.3 100.0	9.1 3.1	100.0
Food industry	0.0 0.0	0.0 0.0	57.9 11.0	10.5 16.7	0.0 0.0	31.6 18.8	100.0
Other	10.0 3.2	0.0 0.0	90.0 9.0	0.0 0.0	0.0 0.0	0.0 0.0	100.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	

Table B.3. Share of the sample in the industry of the Sverdlovsk Oblast

Industrial sector	Share in the number of enterprises			Share in sales			Share in employment		
	1992	1993	1996	1992	1993	1996	1992	1993	1996
Ferrous metallurgy	88.00	91.67	78.57	64.95	84.59	99.10	90.18	96.25	91.43
Non-ferrous metallurgy	87.50	75.00	53.85	70.99	77.56	75.42	96.53	98.31	77.74
Power industry	25.00	25.00	10.53	52.14	65.69	96.62	98.45	98.90	95.97
Fuel industry	25.00	25.00	25.00	96.62	90.64	99.84	72.41	79.81	85.60
Machine-building	32.37	30.77	28.72	31.92	34.51	46.84	46.73	45.84	45.56
Chemical and petrol-chemical industry	64.71	55.00	55.00	71.15	68.39	87.23	91.27	85.42	96.25
Forest industry	11.41	10.63	14.66	31.02	34.71	37.41	36.26	31.16	28.99
Industry of construction materials	30.00	25.00	21.95	34.41	47.27	55.82	70.60	60.60	54.66
Consumer goods industry	23.40	22.45	20.00	54.76	50.18	36.42	55.36	40.63	28.67
Food industry	17.54	16.53	19.23	61.52	50.60	53.41	18.76	43.24	39.08
Other	9.52	7.19	7.35	21.17	17.82	39.52	19.35	17.95	17.45
Total	26.03	23.42	23.68	49.09	58.82	75.70	62.83	62.09	60.28

Appendix C

Table C.1. Sales equation

	Model 1 (*lntsal*)			
	FE regression		RE regression	
	Coef.	P>|t|	Coef.	P>|t|
comp	(dropped)		.245	0.484
otr1	(dropped)		.063	0.716
otr2	(dropped)		.065	0.707
otr3	(dropped)		(dropped)	
otr4	(dropped)		.203	0.706
otr5	(dropped)		P.506***	0.001
otr6	(dropped)		.335*	0.087
otr7	(dropped)		P.063	0.721
otr8	(dropped)		.331*	0.055
otr9	(dropped)		P.514***	0.007
otr10	(dropped)		P.000	0.999
size2	(dropped)		.522	0.248
size3	(dropped)		.425	0.346
size4	(dropped)		.492	0.303
priv	P.045	0.650	P.069	0.428
var1				
var2				
leas				
var1a				
var2a				
t93	P.463***	0.000	P.448***	0.000
t94	P.475***	0.000	P.456***	0.000
t95	P.642***	0.000	P.622***	0.000
t96	P.619***	0.000	P.599***	0.000
PrS1				
PrS2				
PrS3				
PrS4				
cons	.003	0.937	P.581	0.293
nom (189 categories)	F=3.071	0.000		
RPsq	RPsq within=0.2107		RPsq overall=0.2836	
Test statistics for the model	F(5.751)=40.11 Prob>F=0.000		chi2(18)=298.91 Prob>chi2=0.000	
BPL multiplier test for RE			chi2(1)=162.30 Prob>chi2=0.000	
Hausman specification test			chi2(5)=0.21 Prob>chi2=0.9990	

Table C.1 *continued from p. 57*

	Model 1a (*lntsal*)			
	FE regression		RE regression	
	Coef.	P > |z|	Coef.	P > |z|
comp			.246	0.481
otr1			.060	0.732
otr2			.062	0.717
otr3			(dropped)	
otr4			.196	0.716
otr5			P.508***	0.001
otr6			.334*	0.089
otr7			P.064	0.715
otr8			.330*	0.055
otr9			P.517**	0.007
otr10			P.002	0.988
size2			.520	0.248
size3			.422	0.347
size4			.491	0.302
priv	P.086	0.432	P.108	0.266
var1				
var2				
leas				
var1a				
var2a				
t93	P.456***	0.000	P.438***	0.000
t94	P.515***	0.000	P.479***	0.000
t95	P.680***	0.000	P.628***	0.000
t96	P.662***	0.000	P.597***	0.000
PrS1	.091	0.281	.075	0.355
PrS2	.076	0.504	.043	0.673
PrS3	.083	0.576	.032	0.796
PrS4	.085	0.674	.041	0.807
cons	.006	0.881	P.574	0.297
nom (189 categories)	F = 3.059	0.000		
R Psq	R Psq within = 0.2120		R Psq overall = 0.2841	
Test statistics for the model	F(9.747) = 22.33 Prob > F = 0.000		chi2(22) = 299.45 Prob > chi2 = 0.0000	
BPL multiplier test for RE			chi2(1) = 162.09 Prob > chi2 = 0.0000	
Hausman specification test			chi2(9) = 6.51 Prob > chi2 = 0.6877	

Table C.1 *continued from pp 57, 58*

	Model 2a (*lntsal*)			
	FE regression		RE regression	
	Coef.	P>|t|	Coef.	P>|z|
comp	(dropped)		.002	0.996
otr1	(dropped)		.015	0.932
otr2	(dropped)		.027	0.875
otr3	(dropped)		P.210	0.696
otr4	(dropped)		(dropped)	
otr5	(dropped)		P.508***	0.001
otr6	(dropped)		.318	0.106
otr7	(dropped)		P.095	0.591
otr8	(dropped)		.229	0.191
otr9	(dropped)		P.526**	0.006
otr10	(dropped)		P.070	0.680
size2	(dropped)		.490	0.278
size3	(dropped)		.414	0.357
size4	(dropped)		.505	0.291
priv				
var1	P.331**	0.020	P.307**	0.008
var2	P.052	0.646	P.128	0.189
leas	.041	0.789	P.013	0.910
var1a	P.009	0.984	P.233	0.389
var2a	.488**	0.013	.267*	0.078
t93	P.477***	0.000	P.432***	0.000
t94	P.543***	0.000	P.479***	0.000
t95	P.716***	0.000	P.632***	0.000
t96	P.707***	0.000	P.607***	0.000
PrS1	.087	0.296	.082	0.306
PrS2	.081	0.473	.056	0.583
PrS3	.096	0.517	.048	0.700
PrS4	.113	0.575	.064	0.704
cons	P.001	0.972	P.289	0.645
nom (189 categories)	F=3.061	0.000		
RPsq	RPsq within=0.2294		RPsq overall=0.2965	
Test statistics for the model	F(13.743)=17.01 Prob>F=0.000		chi2(26)=320.09 Prob>chi2=0.0000	
BPL multiplier test for RE			chi2(1)=158.54 Prob>chi2=0.0000	
Hausman specification test			chi2(13)=7.93 Prob>chi2=0.8479	

The number of firms is 189, and the number of observations is 945. *** C significant at the 1% level, ** C significant at the 5% level, * C significant at the 10% level.

Table C.2. Equation for employment

	Model 1 (*lntemp*)			
	FE regression		RE regression	
	Coef.	P > |t|	Coef.	P > |t|
comp	(dropped)		P.167	0.297
otr1	(dropped)		P.003	0.966
otr2	(dropped)		P.031	0.690
otr3	(dropped)		(dropped)	
otr4	(dropped)		P.168	0.495
otr5	(dropped)		P.102	0.141
otr6	(dropped)		P.038	0.673
otr7	(dropped)		P.198**	0.015
otr8	(dropped)		P.042	0.589
otr9	(dropped)		P.235***	0.007
otr10	(dropped)		.021	0.780
size2	(dropped)		.061	0.768
size3	(dropped)		P.055	0.788
size4	(dropped)		P.028	0.898
priv	P.024	0.639	P.022	0.602
var1				
var2				
leas				
var1a				
var2a				
t93	P.040	0.359	P.041	0.300
t94	P.144***	0.004	P.146***	0.001
t95	P.249***	0.000	P.250***	0.000
t96	P.347***	0.000	P.348***	0.000
PrS1				
PrS2				
PrS3				
PrS4				
cons	.002	0.935	.245	0.330
nom (189 categories)	F = 2.516	0.000		
R P sq	R P sq within = 0.240		R P sq overall = 0.228	
Test statistics for the model	F(5.751) = 47.52 Prob > F = 0.0000		chi2(18) = 283.55 Prob > chi2 = 0.0000	
BPL multiplier test for RE			chi2(1) = 102.68 Prob > chi2 = 0.000	
Hausman specification test			chi2(5) = 0.00 Prob > chi2 = 1.000	

Table C.2 *continued from p. 60*

	Model 1a (*lntemp*)			
	FE regression		RE regression	
	Coef.	P > |t|	Coef.	P > |z|
comp	(dropped)		.003	0.987
otr1	(dropped)		P.005	0.946
otr2	(dropped)		P.031	0.688
otr3	(dropped)		.168	0.495
otr4	(dropped)		(dropped)	
otr5	(dropped)		P.102	0.142
otr6	(dropped)		P.035	0.690
otr7	(dropped)		P.196**	0.016
otr8	(dropped)		P.041	0.599
otr9	(dropped)		P.236***	0.007
otr10	(dropped)		.021	0.783
size2	(dropped)		.059	0.774
size3	(dropped)		P.056	0.783
size4	(dropped)		P.027	0.899
priv	P.020	0.715	P.018	0.701
var1				
var2				
leas				
var1a				
var2a				
t93	P.043	0.325	P.044	0.261
t94	P.146**	0.012	P.147**	0.002
t95	P.230***	0.002	P.228***	0.000
t96	P.343***	0.000	P.339***	0.000
PrS1	.007	0.859	.007	0.856
PrS2	P.025	0.661	P.027	0.588
PrS3	P.029	0.695	P.034	0.578
PrS4	.058	0.569	.050	0.539
cons	.001	0.944	.076	0.790
nom (189 categories)	F = 2.514	0.000		
R Psq	R Psq within = 0.244		R Psq overall = 0.2308	
Test statistics for the model	F(9.747) = 26.83 Prob > F = 0.0000		chi2(22) = 287.66 Prob > chi2 = 0.0000	
BPL multiplier test for RE			chi2(1) = 103.76 Prob > chi2 = 0.000	
Hausman specification test			chi2(9) = 0.68 Prob > chi2 = 0.999	

Table C.2 *continued from pp 60, 61*

	Model 2a (*Intemp*)			
	FE regression		RE regression	
	Coef.	P > |t|	Coef.	P > |z|
comp	(dropped)		P.173	0.280
otr1	(dropped)		P.017	0.828
otr2	(dropped)		P.042	0.587
otr3	(dropped)		(dropped)	
otr4	(dropped)		P.164	0.504
otr5	(dropped)		P.101	0.148
otr6	(dropped)		P.038	0.669
otr7	(dropped)		P.204**	0.012
otr8	(dropped)		P.074	0.353
otr9	(dropped)		P.238***	0.007
otr10	(dropped)		.000	0.990
size2	(dropped)		.049	0.811
size3	(dropped)		P.059	0.770
size4	(dropped)		P.023	0.915
priv				
var1	P.106	0.140	P.110*	0.051
var2	P.034	0.549	P.049	0.309
leas	.004	0.950	P.018	0.747
var1a	P.044	0.856	P.070	0.582
var2a	.159	0.108	.090	0.220
t93	P.037	0.384	P.028	0.456
t94	P.142**	0.013	P.135***	0.004
t95	P.228***	0.002	P.218***	0.000
t96	P.342***	0.000	P.330***	0.000
PrS1	.010	0.798	.019	0.625
PrS2	P.019	0.730	P.012	0.801
PrS3	P.022	0.762	P.018	0.762
PrS4	.068	0.505	.069	0.406
cons	.000	0.988	.267	0.287
nom (189 categories)	F = 2.484	0.000		
R Psq	R Psq within = 0.251		R Psq overall = 0.239	
Test statistics for the model	F(13.743) = 19.20 Prob > F = 0.000		chi2(26) = 298.60 Prob > chi2 = 0.0000	
BPL multiplier test for RE			chi2(1) = 100.70 Prob > chi2 = 0.000	
Hausman specification test			chi2(13) = 4.29 Prob > chi2 = 0.987	

Table C.3. Equation for profit margin

	Model 1 (*marg*)	
	FE regression	
	Coef.	P > |t|
comp	(dropped)	
otr1	(dropped)	
otr2	(dropped)	
otr3	(dropped)	
otr4	(dropped)	
otr5	(dropped)	
otr6	(dropped)	
otr7	(dropped)	
otr8	(dropped)	
otr9	(dropped)	
otr10	(dropped)	
size2	(dropped)	
size3	(dropped)	
size4	(dropped)	
priv	P.046	0.685
var1		
var2		
leas		
var1a		
var2a		
t93	.269***	0.000
t94	.262***	0.000
t95	.300***	0.000
t96	(dropped)	
PrS1		
PrS2		
PrS3		
PrS4		
infl	.019***	0.000
kred	P.534***	0.000
cons	P.031	0.801
nom (189 categories)	F = 1.357***	0.003
R Psq	R Psq within = 0.2720	
Test statistics for the model	F(6.750) = 46.71 Prob > F = 0.0000	

Table C.3 *continued from p. 63*

	Model 1a (*marg*)	
	FE regression	
	Coef.	P>|t|
comp	(dropped)	
otr1	(dropped)	
otr2	(dropped)	
otr3	(dropped)	
otr4	(dropped)	
otr5	(dropped)	
otr6	(dropped)	
otr7	(dropped)	
otr8	(dropped)	
otr9	(dropped)	
otr10	(dropped)	
size2	(dropped)	
size3	(dropped)	
size4	(dropped)	
priv	P.053	0.671
var1		
var2		
leas		
var1a		
var2a		
t93	.127	0.224
t94	.112	0.348
t95	.219***	0.010
t96	(dropped)	
PrS1	P.100	0.302
PrS2	P.155	0.238
PrS3	P.268	0.117
PrS4	P.374	0.109
infl	.008	0.345
kred	P.546***	0.000
cons	.258	0.241
nom (189 categories)	F=1.366***	0.003
RPsq	RPsq within=0.2748	
Test statistics for the model	F(10.746)=28.27 Prob>F=0.0000	

Table C.3 *continued from pp 63, 64*

	Model 2a (*marg*)	
	FE regression	
	Coef.	P > |t|
comp	(dropped)	
otr1	(dropped)	
otr2	(dropped)	
otr3	(dropped)	
otr4	(dropped)	
otr5	(dropped)	
otr6	(dropped)	
otr7	(dropped)	
otr8	(dropped)	
otr9	(dropped)	
otr10	(dropped)	
size2	(dropped)	
size3	(dropped)	
size4	(dropped)	
priv		
var1	P.071	0.664
var2	P.074	0.572
leas	.031	0.862
var1a	.083	0.880
var2a	.107	0.634
t93	.132	0.212
t94	.119	0.320
t95	.221***	0.010
t96	(dropped)	
PrS1	P.103	0.289
PrS2	P.153	0.247
PrS3	P.262	0.127
PrS4	P.365	0.120
infl	.008	0.302
kred	P.545***	0.000
cons	.237	0.270
nom (189 categories)	F = 1.351***	0.003
R Psq	R Psq within = 0.2759	
Test statistics for the model	F(14.742) = 20.19 Prob > F = 0.0000	

Table C.4. Equation for costs per unit

	Model 1 (*csales*)			
	FE regression		RE regression	
	Coef.	P>|t|	Coef.	P>|z|
comp	(dropped)		.288*	0.060
otr1	(dropped)		P.020	0.794
otr2	(dropped)		.333***	0.000
otr3	(dropped)		(dropped)	
otr4	(dropped)		.418*	0.075
otr5	(dropped)		P.181***	0.007
otr6	(dropped)		.103	0.231
otr7	(dropped)		.010	0.901
otr8	(dropped)		P.038	0.615
otr9	(dropped)		.196**	0.020
otr10	(dropped)		.087	0.243
size2	(dropped)		.241	0.218
size3	(dropped)		.202	0.302
size4	(dropped)		.213	0.306
priv	P.119*	0.070	P.143***	0.004
var1				
var2				
leas				
var1a				
var2a				
kred	.074***	0.001	.068***	0.000
infl	P.015***	0.000	.008	0.410
t93	P.093***	0.004	.263*	0.070
t94	P.097***	0.005	.431**	0.044
t95	P.080**	0.023	.451**	0.036
t96	(dropped)		.572**	0.013
PrS1				
PrS2				
PrS3				
PrS4				
cons	1.084***	0.000	(dropped)	
nom (189 categories)	F=1.356	0.003		
RPsq	RPsq within=0.0922		RPsq overall=0.2304	
Test statistics for the model	F(6.750)=12.69 Prob>F=0.000		chi2(19)=229.36 Prob>chi2=0.000	
BPL multiplier test for RE			chi2(1)=8.42 Prob>chi2=0.0037	
Hausman specification test			chi2(6)=0.59 Prob>chi2=0.9965	

Table C.4 *continued from p. 66*

	Model 1a (*csales*)			
	FE regression		RE regression	
	Coef.	P>|t|	Coef.	P>|z|
comp	(dropped)		.284*	0.065
otr1	(dropped)		P.027	0.732
otr2	(dropped)		.332***	0.000
otr3	(dropped)		(dropped)	
otr4	(dropped)		.420*	0.075
otr5	(dropped)		P.182***	0.007
otr6	(dropped)		.100	0.250
otr7	(dropped)		.007	0.924
otr8	(dropped)		P.039	0.613
otr9	(dropped)		.192**	0.024
otr10	(dropped)		.085	0.257
size2	(dropped)		.240	0.224
size3	(dropped)		.201	0.307
size4	(dropped)		.213	0.308
priv	P.105	0.142	P.151**	0.011
var1				
var2				
leas				
var1a				
var2a				
kred	.079***	0.001	.069***	0.000
infl	P.010**	0.048	.008	0.396
t93	P.029	0.631	.273*	0.064
t94	P.023	0.740	.437**	0.043
t95	P.051	0.301	.431**	0.047
t96	(dropped)		.538**	0.023
PrS1	.020	0.720	.001	0.988
PrS2	.075	0.324	.034	0.601
PrS3	.117	0.234	.054	0.480
PrS4	.146	0.279	.052	0.597
cons	.951***	0.000	(dropped)	
nom (189 categories)	F=1.358	0.003		
RPsq	RPsq within=0.0943		RPsq overall=0.2309	
Test statistics for the model	F(10.746)=7.77 Prob>F=0.000		chi2(23)=228.38 Prob>chi2=0.000	
BPL multiplier test for RE			chi2(1)=8.50 Prob>chi2=0.0036	
Hausman specification test			chi2(10)=2.59 Prob>chi2=0.9894	

Table C.4 *continued from pp 66, 67*

	Model 2a (*csales*)			
	FE regression		RE regression	
	Coef.	P>|t|	Coef.	P>|z|
comp	(dropped)		.324**	0.033
otr1	(dropped)		P.031	0.696
otr2	(dropped)		.339***	0.000
otr3	(dropped)		(dropped)	
otr4	(dropped)		.412*	0.074
otr5	(dropped)		P.205***	0.002
otr6	(dropped)		.089	0.296
otr7	(dropped)		.010	0.892
otr8	(dropped)		P.018	0.815
otr9	(dropped)		.146*	0.081
otr10	(dropped)		.100	0.180
size2	(dropped)		.236	0.222
size3	(dropped)		.197	0.305
size4	(dropped)		.191	0.349
priv				
var1	.067	0.475	.046	0.484
var2	P.126*	0.092	P.110*	0.057
leas	P.064	0.526	P.107*	0.099
var1a	.017	0.958	P.066	0.614
var2a	P.122	0.346	P.183**	0.027
kred	.081***	0.000	.071***	0.000
infl	P.008*	0.081	P.013***	0.000
t93	P.022	0.720	P.077	0.134
t94	P.009	0.901	P.060	0.301
t95	P.046	0.348	P.068	0.141
t96	(dropped)		(dropped)	
PrS1	.012	0.831	P.034	0.511
PrS2	.074	0.327	P.002	0.976
PrS3	.126	0.203	.022	0.773
PrS4	.158	0.240	.018	0.856
cons	.914***	0.000	.503**	0.038
nom (189 categories)	F=1.321	0.006		
RPsq	RPsq within=0.1004		RPsq overall=0.2403	
Test statistics for the model	F(13.742)=5.91 Prob>F=0.000		chi2(27)=245.11 Prob>chi2=0.000	
BPL multiplier test for RE			chi2(1)=6.79 Prob>chi2=0.0092	
Hausman specification test			chi2(14)=9.62 Prob>chi2=0.7892	

Table C.5. Equation for labour productivity

	Model 1 (*sempl*)	
	FE regression	
	Coef.	P>|t|
comp	(dropped)	
otr1	(dropped)	
otr2	(dropped)	
otr3	(dropped)	
otr4	(dropped)	
otr5	(dropped)	
otr6	(dropped)	
otr7	(dropped)	
otr8	(dropped)	
otr9	(dropped)	
otr10	(dropped)	
size2	(dropped)	
size3	(dropped)	
size4	(dropped)	
priv	P2854.184	0.832
var1		
var2		
leas		
var1a		
var2a		
t93	P43816.27***	0.000
t94	P39555.07***	0.003
t95	P40066.21***	0.004
t96	P30679.88**	0.028
PrS1		
PrS2		
PrS3		
PrS4		
cons	117046.4***	0.000
nom (189 categories)	F(188,751)=3.923***	0.000
R Psq	R Psq within=0.0652	
Test statistics for the model	F(5.751)=10.47 Prob>F=0.0000	
BPL multiplier test for RE		
Hausman specification test		

Table C.5 *continued from p. 69*

	Model 1a (*sempl*)	
	FE regression	
	Coef.	P>|t|
comp	(dropped)	
otr1	(dropped)	
otr2	(dropped)	
otr3	(dropped)	
otr4	(dropped)	
otr5	(dropped)	
otr6	(dropped)	
otr7	(dropped)	
otr8	(dropped)	
otr9	(dropped)	
otr10	(dropped)	
size2	(dropped)	
size3	(dropped)	
size4	(dropped)	
priv	P2199.719	0.881
var1		
var2		
leas		
var1a		
var2a		
t93	P43872.54***	0.000
t94	P39242.42**	0.012
t95	P42397.13**	0.030
t96	P33832.25	0.164
PrS1	P1641.455	0.885
PrS2	679.6623	0.965
PrS3	6486.981	0.744
PrS4	P6478.783	0.812
cons	117001.2***	0.000
nom (189 categories)	F(188,747) = 3.841***	0.000
R P sq	R P sq within = 0.0668	
Test statistics for the model	F(9.747) = 5.94 Prob > F = 0.0000	
BPL multiplier test for RE		
Hausman specification test		

Table C.5 *continued from pp 69, 70*

	Model 2a (*sempl*)			
	FE regression		RE regression	
	Coef.	P>|t|	Coef.	P>|z|
comp	(dropped)		95680.33	0.166
otr1	(dropped)		P75626.04***	0.005
otr2	(dropped)		P47734.22	0.066
otr3	(dropped)		206068.7**	0.011
otr4	(dropped)		(dropped)	
otr5	(dropped)		P86195.42***	0.000
otr6	(dropped)		P76604.89***	0.009
otr7	(dropped)		P111663.1***	0.000
otr8	(dropped)		P90669.03***	0.001
otr9	(dropped)		P117410.3***	0.000
otr10	(dropped)		3285.913	0.898
size2	(dropped)		9933.414	0.883
size3	(dropped)		P8242.494	0.903
size4	(dropped)		28104.13	0.695
priv				
var1	P8234.583	0.668	396.0553	0.980
var2	P6136.949	0.691	16484.61	0.223
leas	349.5765	0.987	16145.79	0.323
var1a	22710.7	0.727	28257.31	0.470
var2a	25580.72	0.335	22155.2	0.298
t93	P43150.95***	0.000	P56500.87***	0.000
t94	P38740.45**	0.011	P61790.82***	0.000
t95	P42301.93**	0.028	P73578.06***	0.000
t96	P34103.23	0.153	P73585.98***	0.000
PrS1	P1420.43	0.900	6575.33	0.549
PrS2	1348.319	0.930	17777.33	0.209
PrS3	7474.311	0.709	32591.73*	0.064
PrS4	P5070.442	0.853	28129.57	0.231
cons	116713.1***	0.000	88200.91	0.348
nom (189 categories)	F(188,743) = 3.808***	0.000		
R Psq	R Psq within = 0.0693		R Psq overall = 0.2302	
Test statistics for the model	F(13.743) = 4.26 Prob > F = 0.0000		chi2(26) = 144.58 Prob > chi2 = 0.0000	
BPL multiplier test for RE			chi2(1) = 231.18 Prob > chi2 = 0.0000	
Hausman specification test			chi2(13) = 11.71 Prob > chi2 = 0.5518	

Table C.6. Sales equation

	Model 3 (*lntsal*)			
	FE regression		RE regression	
	Coef.	P>|t|	Coef.	P>|z|
comp	(dropped)		.2064698	0.557
otr1	(dropped)		.0204024	0.910
otr2	(dropped)		.0170733	0.921
otr3	(dropped)		(dropped)	
otr4	(dropped)		.2043899	0.705
otr5	(dropped)		P.5200913***	0.001
otr6	(dropped)		.3178808	0.106
otr7	(dropped)		P.0954752	0.591
otr8	(dropped)		.2676851	0.132
otr9	(dropped)		P.5094798***	0.008
otr10	(dropped)		P.0644316	0.708
size2	(dropped)		.5161433	0.252
size3	(dropped)		.4421639	0.325
size4	(dropped)		.5331498	0.264
var1	P.2340698*	0.093	P.2139152*	0.052
var2	.0398088	0.722	P.0312693	0.734
leas	.0743848	0.628	.0100407	0.929
var1a	P.0828064	0.868	P.1909694	0.476
var2a	.4396366**	0.025	.3081605**	0.036
ust1	.0098211	0.922	.0034588	0.963
ust2	P.3965718*	0.093	P.3545832	0.108
ust3	P.1082432	0.220	P.1516532**	0.045
ust4	P.0471028	0.622	P.0217027	0.794
ust5	P.1556445	0.197	P.162536	0.112
ust6	P.3435688*	0.058	P.3132079*	0.063
t93	P.4939473***	0.000	P.457194***	0.000
t94	P.484876***	0.000	P.4274739***	0.000
t95	P.6574689***	0.000	P.5981265***	0.000
t96	P.6562588***	0.000	P.5992811***	0.000
cons	.0059861	0.895	P.5141955	0.351
nom (189 categories)	F(188,741)=3.041***	0.000		
RPsq	RPsq within=0.2384		RPsq overall=0.3053	
Test statistics for the model	F(15.741)=15.46 Prob>F=0.0000		chi2(28)=334.53 Prob>chi2=0.0000	
BPL multiplier test for RE			chi2(1)=155.59 Prob>chi2=0.0000	
Hausman specification test			chi2(15)=7.99 Prob>chi2=0.9241	

Table C.6 *continued from p. 72*

	Model 4 (*lntsal*)			
	FE regression		RE regression	
	Coef.	P>|t|	Coef.	P>|z|
comp	(dropped)		.2157602	0.543
otr1	(dropped)		.0245101	0.893
otr2	(dropped)		.0181109	0.917
otr3	(dropped)		(dropped)	
otr4	(dropped)		.2148519	0.693
otr5	(dropped)		P.5166255***	0.001
otr6	(dropped)		.3283995*	0.098
otr7	(dropped)		P.0935995	0.602
otr8	(dropped)		.2549146	0.154
otr9	(dropped)		P.5064539***	0.009
otr10	(dropped)		P.0710699	0.682
size2	(dropped)		.5059154	0.266
size3	(dropped)		.4310403	0.342
size4	(dropped)		.5350107	0.267
var1	P.2601634*	0.066	P.2361231**	0.036
var2	.0345326	0.758	P.0344733	0.708
leas	.0561876	0.715	.003706	0.974
var1a	.002255	0.996	P.1531587	0.568
var2a	.4352516**	0.026	.3044493**	0.039
gol1	.0025255	0.980	P.0002471	0.997
gol2	P.4044338*	0.087	P.3615772	0.101
gol3	P.1307056	0.132	P.1532669**	0.036
gol4	P.1038719	0.247	P.0983373	0.205
gol5	P.1590363	0.281	P.1515315	0.267
gol6	.4462556	0.296	.4582325	0.263
t93	P.4906456***	0.000	P.454403***	0.000
t94	P.4706363***	0.000	P.4196226***	0.000
t95	P.6328206***	0.000	P.5807286***	0.000
t96	P.6373763***	0.000	P.5860929***	0.000
cons	.005727	0.900	P.5146531	0.355
nom (189 categories)	F(188.741)=3.066***	0.000		
RPsq	RPsq within=2375		RPsq overall=0.3029	
Test statistics for the model	F(15.741)=15.39 Prob>F=0.0000		chi2(28)=331.50 Prob>chi2=0.0000	
BPL multiplier test for RE			chi2(1)=161.26 Prob>chi2=0.0000	
Hausman specification test			chi2(15)=4.98 Prob>chi2=0.9923	

Table C.7. Equation for employment

	Model 3 (*lntemp*)			
	FE regression		RE regression	
	Coef.	P>|t|	Coef.	P>|z|
comp	(dropped)		P.1704545	0.291
otr1	(dropped)		P.0197843	0.811
otr2	(dropped)		P.0486877	0.539
otr3	(dropped)		(dropped)	
otr4	(dropped)		P.1688761	0.494
otr5	(dropped)		P.111776	0.113
otr6	(dropped)		P.0393265	0.663
otr7	(dropped)		P.2055867**	0.012
otr8	(dropped)		P.072114	0.377
otr9	(dropped)		P.2347343***	0.008
otr10	(dropped)		P.0022263	0.977
size2	(dropped)		.0598855	0.772
size3	(dropped)		P.0476078	0.817
size4	(dropped)		P.0038635	0.986
var1	P.087592	0.214	P.0854193	0.112
var2	P.0097538	0.864	P.0215163	0.633
leas	P.0168352	0.828	P.0275859	0.615
var1a	P.0609009	0.809	P.0474096	0.708
var2a	.1158975	0.243	.0922144	0.198
ust1	P.0149081	0.768	.0074497	0.840
ust2	P.1518087	0.205	P.1288654	0.242
ust3	P.0998889**	0.026	P.0881514**	0.019
ust4	P.0460281	0.341	P.0290916	0.480
ust5	P.0565033	0.355	P.0644127	0.204
ust6	P.0332384	0.717	P.0358565	0.670
t93	P.0405364	0.345	P.0351958	0.362
t94	P.1137368**	0.027	P.1114782**	0.012
t95	P.2142052***	0.000	P.2167577***	0.000
t96	P.3254389***	0.000	P.3300831***	0.000
cons	.008028	0.727	.2600411	0.304
nom (189 categories)	F(188.741) = 2.467***	0.000		
R Psq	R Psq within = 0.2557		R Psq overall = 0.2450	
Test statistics for the model	F(15.741) = 16.97 Prob > F = 0.0000		chi2(28) = 305.90 Prob > chi2 = 0.0000	
BPL multiplier test for RE			chi2(1) = 98.88 Prob > chi2 = 0.0000	
Hausman specification test			chi2(15) = 3.68 Prob > chi2 = 0.9986	

Table C.7 *continued from p. 74*

	Model 4 (*lntemp*)			
	FE regression		RE regression	
	Coef.	P>|t|	Coef.	P>|z|
comp	(dropped)		.0040262	0.985
otr1	(dropped)		P.0141977	0.864
otr2	(dropped)		P.0467783	0.556
otr3	(dropped)		.1772391	0.475
otr4	(dropped)		(dropped)	
otr5	(dropped)		P.1073106	0.129
otr6	(dropped)		P.0344875	0.703
otr7	(dropped)		P.2031199**	0.013
otr8	(dropped)		P.069843	0.392
otr9	(dropped)		P.2319954***	0.009
otr10	(dropped)		.0001604	0.998
size2	(dropped)		.0571566	0.783
size3	(dropped)		P.0507846	0.806
size4	(dropped)		P.007037	0.974
var1	P.1000422	0.163	P.0956581*	0.081
var2	P.0079429	0.889	P.0220117	0.626
leas	P.0213276	0.784	P.0300115	0.584
var1a	P.0669295	0.784	P.0404835	0.749
var2a	.1001985	0.311	.0893398	0.213
gol1	P.018795	0.711	.005602	0.879
gol2	P.1515829	0.206	P.1294523	0.240
gol3	P.099543**	0.024	P.0822033**	0.024
gol4	P.0668676	0.141	P.0577511	0.135
gol5	P.004858	0.948	P.013211	0.846
gol6	.0747924	0.729	.0998045	0.627
t93	P.0393211	0.359	P.03327	0.388
t94	P.1106734**	0.032	P.1097406**	0.013
t95	P.2081892***	0.000	P.2124395***	0.000
t96	P.3203224***	0.000	P.3267203***	0.000
cons	.0100667	0.661	.0861328	0.765
nom (189 categories)	F(188.741) = 2.483***	0.000		
R Psq	R Psq within = 0.2565		R Psq overall = 0.2439	
Test statistics for the model	F(15.741) = 17.04 Prob > F = 0.0000		chi2(28) = 305.87 Prob > chi2 = 0.0000	
BPL multiplier test for RE			chi2(1) = 100.83 Prob > chi2 = 0.0000	
Hausman specification test			chi2(15) = 3.52 Prob > chi2 = 0.9989	

Table C.8. Equation for profit margin and productivity of labour

	Model 3a (*marg*)	
	FE regression	
	Coef.	P>|t|
comp	(dropped)	
otr1	(dropped)	
otr2	(dropped)	
otr3	(dropped)	
otr4	(dropped)	
otr5	(dropped)	
otr6	(dropped)	
otr7	(dropped)	
otr8	(dropped)	
otr9	(dropped)	
otr10	(dropped)	
size2	(dropped)	
size3	(dropped)	
size4	(dropped)	
var1	P.027	0.872
var2	P.006	0.963
leas	P.037	0.839
var1a	.068	0.905
var2a	P.025	0.914
ust1	P.092	0.452
ust2	.027	0.922
ust3	P.191*	0.073
ust4	P.233**	0.040
ust5	P.139	0.326
ust6	P.149	0.472
PrS1	P.060	0.549
PrS2	P.084	0.548
PrS3	P.214	0.239
PrS4	P.313	0.196
t93	.107	0.319
t94	.129	0.291
t95	.229***	0.008
t96	(dropped)	
infl	.008	0.339
kred	P.548***	0.000
cons	.285	0.198
nom (189 categories)	F(188.736) = 1.349***	0.004
RPsq	RPsq within = 0.2823	
Test statistics for the model	F(20.736) = 14.47 Prob > F = 0.0000	
BPL multiplier test for RE		
Hausman specification test		

Table C.8 *continued from p. 76*

	Model 4a (*marg*)	
	FE regression	
	Coef.	P>|t|
comp	(dropped)	
otr1	(dropped)	
otr2	(dropped)	
otr3	(dropped)	
otr4	(dropped)	
otr5	(dropped)	
otr6	(dropped)	
otr7	(dropped)	
otr8	(dropped)	
otr9	(dropped)	
otr10	(dropped)	
size2	(dropped)	
size3	(dropped)	
size4	(dropped)	
var1	P.046	0.783
var2	P.005	0.970
leas	P.045	0.805
var1a	P.020	0.972
var2a	P.037	0.871
gol1	P.101	0.410
gol2	.030	0.913
gol3	P.217**	0.038
gol4	P.198*	0.064
gol5	P.125	0.459
gol6	.142	0.772
PrS1	P.059	0.558
PrS2	P.075	0.594
PrS3	P.198	0.276
PrS4	P.291	0.229
t93	.112	0.297
t94	.139	0.253
t95	.238***	0.006
t96	(dropped)	
infl	.008	0.320
kred	P.548***	0.000
cons	.281	0.202
nom (189 categories)	F(188.736) = 1.347***	0.004
R Psq	R Psq within = 0.2825	
Test statistics for the model	F(20.736) = 14.49 Prob > F = 0.0000	
BPL multiplier test for RE		
Hausman specification test		

Table C.8 *continued from pp 76, 77*

	Model 4a (*sempl*)	
	RE regression	
	Coef.	P>|z|
comp	P111735.6**	0.038
otr1	P76350.4***	0.005
otr2	P47649.1*	0.067
otr3	(dropped)	
otr4	P201836.1**	0.013
otr5	P85788.25***	0.000
otr6	P77192.35***	0.009
otr7	P112949.6***	0.000
otr8	P91039.99***	0.001
otr9	P117797.3***	0.000
otr10	2888.581	0.911
size2	8848.163	0.896
size3	P9478.288	0.888
size4	26728.98	0.710
var1	491.4135	0.977
var2	15720.22	0.255
leas	19017.01	0.254
var1a	28260.3	0.471
var2a	23862.78	0.267
gol1	361.1366	0.974
gol2	17692.58	0.563
gol3	7941.429	0.452
gol4	5775.755	0.600
gol5	P9215.949	0.625
gol6	39084.13	0.491
PrS1	4686	0.678
PrS2	15192.49	0.310
PrS3	30707.95*	0.098
PrS4	25353.94	0.299
t93	P56036.39***	0.000
t94	P63177.72***	0.000
t95	P74896.14***	0.000
t96	P73782.58***	0.000
infl		
kred		
cons	294458.2***	0.000
nom (189 categories)		
RPsq	RPsq overall = 0.2329	
Test statistics for the model	chi2(32) = 146.08 Prob > chi2 = 0.0000	
BPL multiplier test for RE	chi2(1) = 223.19 Prob > chi2 = 0.0000	
Hausman specification test	chi2(19) = 24.54 Prob>chi2 = 0.1761	

Table C.9. Equation for costs per unit

	Model 3 (*csales*)			
	FE regression		RE regression	
	Coef.	P > |t|	Coef.	P > |z|
comp	(dropped)		P.091	0.651
otr1	(dropped)		P.041	0.603
otr2	(dropped)		.332***	0.000
otr3	(dropped)		P.414*	0.079
otr4	(dropped)		(dropped)	
otr5	(dropped)		P.221***	0.001
otr6	(dropped)		.074	0.394
otr7	(dropped)		.000	0.997
otr8	(dropped)		P.029	0.713
otr9	(dropped)		.141*	0.099
otr10	(dropped)		.110	0.151
size2	(dropped)		.249	0.206
size3	(dropped)		.213	0.278
size4	(dropped)		.208	0.318
var1	.038	0.675	.040	0.512
var2	P.170**	0.021	P.120**	0.021
leas	P.054	0.592	P.109*	0.086
var1a	P.233	0.474	P.103	0.431
var2a	P.160	0.213	P.192**	0.017
ust1	.093	0.158	P.012	0.792
ust2	.023	0.881	P.033	0.810
ust3	.023	0.691	P.025	0.584
ust4	.183***	0.004	.105**	0.036
ust5	P.121	0.125	P.133**	0.029
ust6	.097	0.415	.039	0.708
kred	.080***	0.000	.070***	0.000
infl	P.012***	0.000	P.014***	0.000
t93	P.068*	0.084	P.105***	0.003
t94	P.072*	0.070	P.101***	0.006
t95	P.076**	0.034	P.085**	0.016
t96	(dropped)		(dropped)	
cons	1.001***	0.000	.949***	0.001
nom (189 categories)	F(188.740) = 1.355***	0.003		
R Psq	R Psq within = 0.1179		R Psq overall = 0.2496	
Test statistics for the model	F(16.740) = 6.18 Prob > F = 0.0000		chi2(29) = 253.38 Prob>chi2 = 0.0000	
BPL multiplier test for RE			chi2(1) = 7.64 Prob > chi2 = 0.0057	
Hausman specification test			chi2(16) = 8.35 Prob > chi2 = 0.9379	

Table C.9 *continued from p. 79*

	Model 4 (*csales*)			
	FE regression		RE regression	
	Coef.	P>|t|	Coef.	P>|z|
comp	(dropped)		.327**	0.033
otr1	(dropped)		P.029	0.714
otr2	(dropped)		.340***	0.000
otr3	(dropped)		(dropped)	
otr4	(dropped)		.416*	0.076
otr5	(dropped)		P.203***	0.003
otr6	(dropped)		.086	0.317
otr7	(dropped)		.019	0.803
otr8	(dropped)		P.017	0.831
otr9	(dropped)		.149*	0.078
otr10	(dropped)		.097	0.202
size2	(dropped)		.248	0.204
size3	(dropped)		.210	0.281
size4	(dropped)		.207	0.318
var1	.042	0.651	.035	0.569
var2	P.162**	0.029	P.117**	0.024
leas	P.039	0.698	P.106*	0.097
var1a	.089	0.780	P.082	0.526
var2a	P.130	0.312	P.191**	0.018
gol1	.100	0.132	P.011	0.798
gol2	.010	0.946	P.035	0.799
gol3	.051	0.377	P.013	0.767
gol4	.110*	0.062	.037	0.428
gol5	P.051	0.597	P.044	0.605
gol6	P.123	0.660	P.295	0.256
kred	.080***	0.000	.070***	0.000
infl	P.012***	0.000	P.014***	0.000
t93	P.058	0.145	P.099***	0.006
t94	P.072*	0.070	P.102***	0.006
t95	P.080**	0.027	P.087**	0.015
t96	(dropped)		(dropped)	
cons	.977***	0.000	.520**	0.032
nom (189 categories)	F(188.740) = 1.331***	0.005		
R Psq	R Psq within = 0.1047		R Psq overall = 0.2419	
Test statistics for the model	F(16.740) = 5.41 Prob > F = 0.0000		chi2(29) = 243.39 Prob > chi2 = 0.0000	
BPL multiplier test for RE			chi2(1) = 6.46 Prob > chi2 = 0.0110	
Hausman specification test			chi2(16) = 10.69 Prob > chi2 = 0.8279	

REFERENCES

Anderson R.E., Djankov S., Pohl G., Claessens S. *Privatization and Restructuring in Central and Eastern Europe* //Private Sector, 1997. No 11, 23P26.

Atkinson S.E., Halvorsen R. *The Relative Efficiency of Public and Private Firms in a Regulated Environment*: *The Case of U.S. Electric Utilities* //Journal of Public Economics, 1986. Vol. 29, 281P294.

Barberis N., Boycko M., Shleifer A., Tsukanova N. *How Does Privatization Work*? *Evidence from Russian Shops* //Journal of Political Economy, 1996. Vol. 104(4), 764P790.

Barbone L., Marchetti D., Paternostro S. *Structural Adjustment*, *Ownership Transformation*, *Size in Polish Industry.* Policy Research Working Paper, No 1624. Washington: World Bank, 1996.

Berle A., Means G. *The Modern Corporation and Private Property.* New York: MacMillan, 1932.

Boardman A.E., Vining A.R. *Ownership and Performance in Competitive Environments*: *A Comparison of the Performance of Private*, *Mixed*, *State-Owned Enterprises* //Journal of Law and Economics, 1989. Vol.32, 1P32.

Bresnahan T.F., Reiss P.C. *Entry and Competition in Concentrated Markets* //Journal of Political Economy, 1991. Vol. 99, 977P1009.

Brown A.N., Ickes B.W., Ryterman R. *The Myth of Monopoly*: *A New View of Industrial Structure in Russia.* Washington: World Bank, 1993.

Caves D.W., Christensen L.R. *The Relative Efficiency of Public and Private Firms in a Competitive Environments*: *The Case of Canadian Railroads* //Journal of Political Economy, 1980. Vol. 88, 958P976.

Commander S., Fan Q., Schaffer M.E. (Eds) *Enterprise Restructuring and Economic Policy in Russia.* Washington: The World Bank, 1996.

Demsetz H., Lehn K. *The Structure of Corporate Ownership*: *Causes and Consequences* //Journal of Political Economy, 1985. Vol. 93(6), 1155P1177.

Dewenter K.L., Malatesta P.H. *State-Owned and Private-Owned Firms*: *An Empirical Analysis of Profitability*, *Leverage and Labor Intensity* //Financial Economics Network Working Papers, August 25, 1998.

Earle J., Estrin S. *Privatization versus Competition*: *Changing Enterprise Behaviour in Russia.* Report No 315. London: Centre for Economic Performance, 1996.

Earle J., Estrin S. *After Voucher Privatization*: *The Structure of Corporate Ownership in Russian Manufacturing Industry*. Site Working Paper No 120.

Stockholm: Stockholm Institute of Transition Economics and East European Economies, 1997.

Eckel C., Eckel D., Singal V., *Privatization and Efficiency*: *Industry Effects of the Sale of British Airways* //Journal of Financial Economics, 1997. Vol. 43, 275P298.

Estrin S.A., Gelb A., Singh I.J. *Restructuring*, *Viability and Production*: *A Comparative Study of Enterprise Adjustment in Transition.* Discussion Paper No 1. London: London Business School, CIS Middle Europe Centre, 1993.

Frydman R., Gray C., Hessel M., Rapaczynski A. *Private Ownership and Corporate Performance*: *Some Lessons from Transition Economies.* Economic Research Reports. No 97P28. New York: New York University, C.V. Starr Center for Applied Economics, 1997.

Frydman R., Gray C., Hessel M., Rapaczynski A. *When Does Privatization Work*? *The Impact of Private Ownership on Corporate Performance in the Transition Economies.* Economic Research Reports No 98P32. New York: New York University, C.V. Starr Center for Applied Economics, 1998.

Galal A., Jones L., Tandon P., Vogelsang I. *Welfare Consequences of Selling Public Enterprises*: *An Empirical Analysis.* New York: Oxford University Press, 1994.

Greene W.H. *Econometric Analysis.* Third Edition. New Jersey: Prentice Hall, 1995.

Grosfeld I., Nivet J.-F. *Wage and Investment Behavior in Transition*: *Evidence from a Polish Panel Data Set*. A paper presented at the conference "Economic Transition in CEE and Russia: Theory and Empirical Evidence". Moscow: EERC, 1997.

Jain B., Kini O. *The Post-Issue Operating Performance of IPO Firms* //Journal of Finance, 1994. Vol. 49, 1699P1726.

Jensen M.C., Meckling W. *Theory of the Firm*: *Managerial Behavior*, *Agency Costs*, *Capital Structure* //Journal of Financial Economics, 1976. Vol. 3, 305P360.

Johnston J., DiNardo J. *Econometric Methods*. New York: Mcgraw-Hill Companies, Inc., 1997.

Kikeri S., Nellis J., Shirley M. *Privatization*: *Lessons from Market Economies* //The World Bank Research Observer, 1994. Vol. 9(2), 241P273.

Kole S.R., Mulherin J.H. *The Government as Shareholder*: *A Case from the US* //Journal of Law and Economics, 1997. Vol. 40, 1P22.

Konings J. *Competition and Firm Performance in Transition Economies*: *Evidence from Firm Level Surveys in Slovenia*, *Hungary and Romania*. Discussion Paper No 1770. London: Centre for Economic Policy Research, 1997.

Kornai J. *The Socialist System. The Political Economy of Communism*. Prinston: Prinston University Press, 1992.

Krueger A.O. *Government Failures in Development* //Journal of Economic Perspectives, 1990. Vol. 4, 9P23.

La Porta R., Lopez-de-Silanes F. *The Benefits of Privatization*: *Evidence from Mexico*. Working Paper No 6215. Cambridge: National Bureau of Economic Research, 1997.

La Porta R., Lopez-de-Silanes F. Shleifer A. *Corporate Ownership around the World.* Working Paper No 6625. Cambridge: National Bureau of Economic Research, 1998.

Martin S., Parker D. *Privatization and Economic Performance throughout the UK Business Cycle* //Managerial and Decision Economics, 1995. Vol. 16, 225P237.

Megginson W.L., Nash R.C., van Randenborgh M. *The Financial and Operating Performance of Newly Privatized Firms*: *An Empirical Analysis* //The Journal of Finance, 1994. Vol. XLIX(2), 403-452.

Mikkelson W.H., Partch M.M., Shah K. *Ownership and Operating Performance of Companies That Go Public* //Journal of Financial Economics, 1997. Vol. 44(3). 281P307.

Nellis J. *Privatization in Reforming Socialist Economies* //Current Implementation Issues. Ljubljana: International Center for Public Enterprises in Developing Countries, 1991. P.15P23.

Nellis J. *Time to Rethink Privatization in Transition Economies*? //Transition, 1999. Vol. 10(1). 4P6.

Nickel S.J. *Competition and Corporate Performance* //Journal of Political Economy, 1996. Vol. 104(4), 724P746.

Pagano M. Panetta F., Zingales L. *Why Do Companies Go Public*? *An Empirical Analysis.* //Financial Economic Network Working Paper Series. 1998.

Perotti E.C., Guney S.E. *The Structure of Privatization Plans* //Financial Management, Spring 1993. P. 84P98.

Phelps E.S. *Conclusions*, Villa Mondragone International Seminar //Rivista di Politica Economica, December 1992 (from: Gylfason T., Herbertsson T.T., Zoega G. *Ownership and Growth.* Discussion Paper No 1900. London: Centre for Economic Policy Research, 1998).

Pinto B., van Wijnbergen S. *Ownership and Corporate Control in Poland*: *Why State Firms Defied the Odds*? Discussion Paper No 1273. London: Centre for Economic Policy Research, 1995.

Shapiro C., Willig R. *Economic Rationales for the Scope of Privatization* //Economy of Public Sector Reform and Privatization. London: Westview Press, 1990. P. 55P87.

Shleifer A., Vishny R.W. *Politicians and Firms* //Quarterly Journal of Economics, 1994.

Simon H.A. *A Behavioural Model of Rational Choice* //Quarterly Journal of Economics, 1955. 99-118; Cyert R.M., March J.G. *A Behavioural Theory of the Firm*. Prentice-Hall, 1963.

Teoh S.H., Wong T.J., Rao G. *Incentives and Opportunities for Earnings in Initial Public Offerings.* Working Paper. Los Angeles: University of California, 1994.

The European Observatory for SMEs. First Annual Report. European Network for SME Research, 1993.

Vickers J., Yarrow G. *Privatization*: *An Economic Analysis*. Cambridge: Massachusetts: MIT Press, 1988.

Willig R. D. *Corporate Governance and Market Structure* /Economic Policy in Theory and Practice /Eds A.Razin, E.Sadka. London: Macmillan, 1987 (from: Nickel S.J. *Competition and Corporate Performance* //Journal of Political Economy, 1996. Vol. 104(4), 724P746.

жор Л.Р., н оложöкюы— ±.е., Р—ўö..ркöо х.Н., ±№.№®–кою е.к. *Приватизация-1996*: *Итоги и выводы* //л сщ№ўкр – экоью...–кö, 1997. № 4, 147Р177.

мN@N№öлою – .е., з ö–ö®й–ы е.п., з–®кою Л.и., М–..ä„ – й.Э., юос®о„ №–е.е., Ро..öьюкöо л.Л. *Приватизация и эффективность деятельности отраслей и предприятий*: *Ситуация в промышленности Свердловской области*. ®köўN®–ыс–®йт о®л РЛк, 1998.

мN@N№öлою – .е., М–..ä„ – й.Э., юос®о„ №–е.е. *Влияние приватизации на работу предприятий промышленности*: *анализ ситуации в Свердловской области* //Экл, 1998. № 7Р8.

мN@N№öлою – .е., М–..ä„ – й.Э., юос®о„ №–е.е. *Влияет ли приватизация на деятельность предприятий*? //ео•®о–ы экоью...–к–, 1999. № 6, 6Р89.

LIST OF TABLES